Appendix B

Fact Sheets in Support of Draft Section 303(d) list of Impaired Waters

2002 Update

Beneficial Use Definitions and Acronyms

Under the Clean Water Act, Section 303 requires that the State adopt designated beneficial uses for surface waters. Beneficial uses are defined in the Basin Plan as the uses of water necessary for the survival or well being of humans, plants and wildlife. Beneficial uses include those uses specifically designated in the Basin Plan, and include both "existing" and "potential" beneficial uses.

The numeric water quality objectives that are applicable in a water body with an "existing beneficial use" are the same water quality objectives that are applicable in a water body with the same, but "potential" beneficial use. Legally, there is no distinction between a REC1 beneficial use designation and a potential REC1 beneficial use designation; the waterbodies so designated must be equally protected.

Abbreviation	Beneficial Use Designation
AGR	Agricultural Supply
AQUA	Aquaculture
BIOL	Preservation of Biological Habitats of Special Significance
COLD	Cold Freshwater Habitat
COMM	Commercial and Sport Fishing
EST	Estuarine Habitat
FRSH	Freshwater Replenishment
GWR	Ground Water Recharge
IND	Industrial Service Supply
MAR	Marine Habitat
MIGR	Migration of Aquatic Organisms
MUN	Municipal an Domestic Supply
NAV	Navigation
POW	Hydropower Generation
PROC	Industrial Process Supply
RARE	Rare, Threatened or Endangered Species
REC-1	Contact Water Recreation
REC-2	Non-Contact Water Recreation
SAL	Inland Saline Water Habitat
SHELL	Shellfish Harvesting
SPWN	Spawning, Reproduction, and/or Early Development
WARM	Warm Freshwater Habitat
WILD	Wildlife Habitat

Please see the Water Quality Control Plan for the San Diego Basin (9) (1994, California Regional Water Quality Control Board, San Diego Region) for the definition of each beneficial use designation.

ALISO CREEK
Hydrologic Subarea 901.13

NEW 303(d) LISTINGS

Enterococci, *Escherichia coli*, Fecal Coliform, Phosphorus and Toxicity.

PREVIOUS 303(d) LISTINGS

Coliform (lower 1 mile of creek)

WATERSHED CHARACTERISTICS

The following description of the Aliso Creek Watershed is taken from the Aliso Creek Water Quality Planning Study, Quarterly Progress Report[1]. The Aliso Creek watershed encompasses a drainage area of 34.6 square miles in southern Orange County including the communities of Portola Hills and Leisure World, and the cities of Aliso Viejo, Lake Forest, Laguna Hills, Laguna Niguel, Laguna Woods and portions of Mission Viejo and Laguna Beach. The watershed drains for a distance of 16.5 miles in a northeast to southwest direction from the Santa Ana mountains of the Cleveland National Forest to the Pacific Ocean south of Laguna Beach. The upper half of the watershed, north of Interstate 5, is relatively narrow (1-2 miles), while the lower half broadens to a maximum of 5 miles in Laguna Niguel. The major tributaries of Aliso Creek are Sulphur Creek, Wood Canyon, Aliso Hills Channel, Dairy Fork, and English Canyon.

Aliso Creek is classified as inland surface water with the following beneficial uses: AGR, REC1 (designated potential), REC2, WARM and WILD[2].

WATER QUALITY OBJECTIVES NOT ATTAINED

The bacterial objectives used for evaluation of Aliso Creek water quality pertain to freshwater areas considered moderately or lightly used. This particular decision, namely the extent to which the area is used, is based on best professional judgement. If both steady state (30-day period) and single sample objectives are available, only the particular objective used for data assessment is described.

Enterococci The Basin Plan[2] REC1 single sample maximum allowable density is 108 colonies/100 mL, for a moderately or lightly used area.

***Escherichia coli* (*E. coli*)** The Basin Plan[2] REC1 single sample maximum allowable density is 406 colonies/100 mL, for a moderately or lightly used area.

Fecal coliform The Basin Plan[2] REC1 objective states that for not less than 5 samples, in any 30-day period, the log mean shall not exceed 200 colonies/100 mL. Additionally, no more than 10% of the total samples during any 30-day period shall exceed 400 colonies/100 mL.

Phosphorus The Basin Plan[2] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[2] biostimulatory substance objective for phosphorus (P) is 0.1 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

Toxicity The Basin Plan[2] objective states that "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life."

EVIDENCE OF IMPAIRMENT

Enterococci Data collected in June to August, 1999 for the Aliso Creek Water Quality Planning Study[3] showed enterococci concentrations in excess of the single sample maximum allowable density of 108 colony forming units (CFU)/100 mL at several locations along Aliso Creek. From up to downstream, the following locations had these percentages of exceedances out of 9 total samples: at Cooks Corner (44%), downstream of English Canyon Creek (33%), downstream of Dairy Fork Creek (78%), downstream of Sulphur Creek (44%) and at Pacific Coast Highway (33%). It should be noted that these samples were taken in dry weather.

The tributaries to Aliso Creek also showed impairment. From June to August, 1999 the following tributaries had these percentages of exceedances out of 9 total samples: English Canyon Creek (56%), Dairy Fork Creek (78%), Aliso Hills Channel (100%), Sulphur Creek (33%) and Wood Canyon Creek (22%). It should be noted that these samples were taken in dry weather. These values show clear evidence of impairment of the REC1 beneficial use.

Escherichia coli Data collected in June to August, 1999 for the Aliso Creek Water Quality Planning Study[3] showed *E. coli* concentrations in excess of the single sample maximum allowable density of 406 colonies/100 mL at several locations along Aliso Creek. From up to downstream, the following locations had these percentages of exceedances out of 9 total samples: at Cooks Corner (22%), downstream of English Canyon Creek (56%), downstream of Dairy Fork Creek (89%) and downstream of Sulphur Creek (33%). It should be noted that these samples were taken in dry weather.

The tributaries to Aliso Creek also showed impairment due to *E. coli*. From June to August, 1999 the following tributaries had these percentages of exceedances out of 9 total samples: English Canyon Creek (44%), Dairy Fork Creek (78%), Aliso Hills Channel (67%), Sulphur Creek (22%) and Wood Canyon Creek (33%). It should be noted that these samples were taken in dry weather. These values show clear evidence of impairment of the REC1 beneficial use.

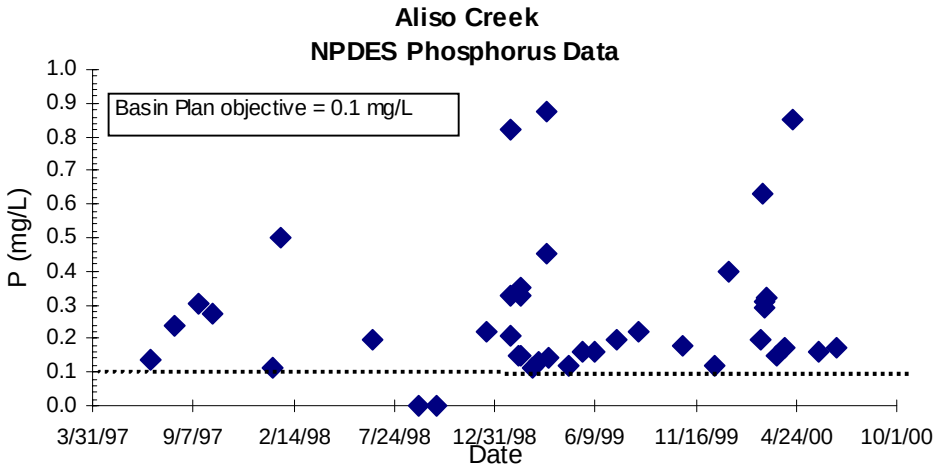
Fecal coliform Data collected in October, 1998 for the Aliso Creek Water Quality Planning Study[3] show 4 locations along the creek to have log mean concentrations of fecal coliform well above the Basin Plan 30-day log mean objective of 200 colonies/100 mL. From up to downstream, the following locations had these log means: downstream of English Canyon Creek (1074 Most Probable Number (MPN)/100 mL), downstream of Dairy Fork Creek (4308 MPN/100 mL), downstream of Sulphur Creek (1410 MPN/100 mL) and at Pacific Coast Highway (3178 MPN/100 mL). Each of these log mean values were calculated using 5 samples in a 30-day period.

From October to December 1998, there were several exceedances of the Basin Plan objective of 400 MPN/100 mL (not to be exceeded by more than 10% of the total samples during any 30-day period). A breakdown of 30-day sampling periods at each location is shown in the table below, clearly indicating impairment of the REC1 beneficial use.

	No. of Exceedances (REC1, Fecal Coliform)		
	October '98 (5 total samples)	**November '98** (3 total samples)	**December '98** (4 total samples)
at Cooks Corner	2 (40%)	2 (66%)	0
d/s English Canyon Creek	4 (80%)	2 (66%)	1 (25%)
d/s Dairy Fork Creek	5 (100%)	2 (66%)	1 (25%)
d/s Sulphur Creek	4 (80%)	1 (33%)	1 (25%)
at Pacific Coast Highway	5 100%)	1 (33%)	0

Phosphorus Data collected between July, 1997 and June, 2000 contained in the County of Orange NPDES Annual Progress Report[4] shows the Phosphorus objective to be exceeded more than 10% of the time during a one-year period. These data were converted from PO_4 to their equivalent phosphorus value. From July 1997 to June 1998, 5 of 5 samples (100%) exceeded the objective, with a mean of 0.23 mg/L and a median of 0.24 mg/L. From September 1998 to August 1999, 20 of 22 samples (91%) exceeded the objective, with a mean of 0.26 mg/L and a median of 0.18 mg/L. From October 1999 to June 2000, 13 of 13 samples (100%) exceeded the objective, with a mean of 0.304 mg/L and a median of 0.20 mg/L. See figure below for phosphorus concentrations plotted against time of year.

Samples collected at two locations of Aliso Creek on June 10, 1998 show both locations to have phosphorus concentrations (converted from phosphate) in excess of the Basin Plan objective for phosphorus. This data is from the California Regional Water Quality Control Board, San Diego Region (Regional Board) In-house monitoring[5]. At Country Club Road, the phosphorus concentration was 0.93 mg/L. At Pacific Park Drive and Oso Parkway, the concentration was 0.81 mg/L.



These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that may impair the REC1, REC2, WARM and WILD

beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[2].

Toxicity Water collected in September 1998, November 1998 and January 1999 for the Aliso Creek Water Quality Planning Study[3] showed toxicity to juvenile fathead minnows and *Ceriodaphnia dubia* for the latter two sampling dates. It should be noted that the latter two dates represent storm events, while the first sampling took place during low flow conditions. In 11 of 20 toxicity tests, survival rates for both species were less than 70%, with 10 of those 11 having survival rates less than 50%. The average survival rate for juvenile fathead minnows was 79%, with a median of 85%. The average survival rate for *Ceriodaphnia dubia* was 22%, with a median of 0%. This toxicity data is direct evidence of the impairment to the WARM and WILD beneficial uses of this waterbody.

EXTENT OF IMPAIRMENT

Enterococci Sampling occurred along the entire reach of Aliso Creek and in several tributaries. Since all locations contained elevated enterococci levels, the majority of the hydrologic sub area (HSA # 901.13) is impaired, specifically including the tributaries of Aliso Hills Channel, English Canyon Creek, Dairy Fork Creek, Sulphur Creek and Wood Canyon Creek.

E. coli Sampling occurred along the entire reach of Aliso Creek and in several tributaries. Since all locations contained elevated enterococci levels, the majority of the hydrologic sub area (HSA # 901.13) is impaired, specifically including the tributaries of Aliso Hills Channel, English Canyon Creek, Dairy Fork Creek, Sulphur Creek and Wood Canyon Creek.

Fecal coliform Current listing describes the extent of impairment as the lower 1 mile of Aliso Creek. Since recent sampling occurred along the entire reach of Aliso Creek, the entire reach (7.2 miles) is listed as impaired due to fecal coliform.

Phosphorus Sampling occurred at site ACJO1 (near the mouth of the creek) for the County of Orange NPDES Annual Progress Report[4], and further upstream at Country Club Rd and at Pacific Park Dr. / Oso Parkway for the Regional Board In-house monitoring[5]. The furthest upstream station is approximately in the middle of the creek. Therefore, Aliso Creek is listed as impaired for phosphate from ½ mile upstream of Pacific Park Dr. / Oso Parkway all the way down to the mouth of the creek. This covers the lower 4 miles of the creek.

Toxicity Five stations, from the headwaters to the mouth, were sampled. All 5 stations showed toxicity for one or both of the storm event samplings. Therefore, the entire reach (7.2 miles) is listed as impaired due to toxicity.

POTENTIAL SOURCES

Enterococci Urban runoff, other point sources and non-point sources

E. coli Urban runoff, other point sources and non-point sources

Fecal coliform Urban runoff, other point sources and non-point sources

Phosphorus Urban runoff, other point sources and non-point sources

Toxicity The Aliso Creek Water Quality Planning Study[3] indicates organophosphate pesticides are a significant component of the aquatic toxicity in storm samples. Organophosphate pesticides are found in urban and agricultural run-off.

TMDL PRIORITY

Enterococci	Medium
E. coli	Medium
Fecal coliform	Medium
Phosphorus	Medium
Toxicity	Medium

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Aliso Creek Water Quality Planning Study, Quarterly Progress Report, January 1, 1999 – March 31, 1999. Agreement No. 7-042-250-0, Aliso Creek 205(j) Water Quality Planning Study.

[2] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[3] Aliso Creek Water Quality Planning Study, Draft Final Report, Aliso Creek 205(j) Water Quality Planning Study. June, 2000. Agreement No. 7-042-250-0.

[4] NPDES Annual Progress Report, County of Orange. November, 2000. Orange County Board of Supervisors. Regional Water Quality Control Board, San Diego Region: Order No. 96-03.

[5] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region

DANA POINT HARBOR
Hydrologic Subarea 901.14

NEW 303(d) LISTINGS

Copper (dissolved) and Bacterial Indicators (please see Fact Sheet entitled "PACIFIC OCEAN SHORELINE FOR THE SAN DIEGO REGION" on pages B-69 to B-74 for rationale pertaining to the Bacterial Indicators listing recommendation)

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

Dana Point Harbor is a 215-acre waterbody in the San Juan Hydrologic Unit. It is classified coastal water with the following beneficial uses: IND, NAV, REC1, REC2, COMM, WILD, RARE, MAR, MIGR, SPWN AND SHELL[1].

WATER QUALITY OBJECTIVES NOT ATTAINED

Copper (dissolved)

The Criteria Maximum Concentration (CMC) 1-Hour Average for dissolved copper is 4.8 µg/L. The CMC is the California Toxics Rule[2] water quality criteria to protect against acute effects in aquatic life and is the highest short-term average concentration of a priority toxic pollutant not to be exceeded more than once every three years on the average.

The Criteria Continuous Concentration (CCC) 4-Day Average for dissolved copper is 3.1 µg/L. The CCC is the California Toxics Rule[2] water quality criteria to protect against chronic effects in aquatic life and is the highest 4-day average concentration not to be exceeded more than once every three years on the average.

NOAA has published Sediment Quality Guidelines[3] as informal, non-regulatory guidelines for use in interpreting chemical data from analyses of sediments. The ERL (Effects Range Low) for total copper is 34 ppm, dry weight. It is the lowest 10th percentile and is the concentration below which adverse effects rarely occur. The ERM (Effects Range Median) for total copper is 270 ppm, dry weight. It is the 50th percentile and is the concentration above which effects frequently occur.

EVIDENCE OF IMPAIRMENT

Elevated Dissolved Copper

Data from the County of Orange's Annual NPDES Progress Report[4] indicate elevated dissolved copper concentrations in Dana Point Harbor. Five stations were sampled within the harbor and just outside the mouth. Data goes as far back as 1991, but samples were not analyzed for dissolved copper until the year 2000. The permit requires only that two storm events be sampled per year. While there is some dry weather data, it was only analyzed for total copper. Only dissolved copper could be compared against the water quality objectives mentioned above. The Metals Translator[5] was not used to convert total copper concentrations to dissolved copper concentrations due to the uncertainty in the conversion during high flow events. Therefore, all dissolved copper values come from storm events.

Dissolved copper data for three separate storm events has been reviewed (Table 1). Only the first storm event had concentrations above the applicable criteria. This occurred from 17 to 21 April 2000, when all 15 samples (3 at each of 5 sites) had

concentrations above the CMC. Pooling all 15 samples produced a mean of 28.5 µg/L and a median of 27.0 µg/L. This median concentration was over 460% above the CMC. During the other two storm events, dissolved copper was only detected twice (detection limit of 2.0 µg/L). These storms occurred from 24 to 28 January 2001 and from 26 February to 2 March 2001. The two detected values were 3.2 and 2.0 µg/L and did not exceed the CMC. In total, 15 of 45 (33%) samples (3 of 9 at each station) exceeded the CMC (Table 1). Only 1 of 3 (33%) storms had elevated dissolved copper concentrations, but these values were well above the applicable criteria.

Table 1

Station	DAPTEB (ug/L)	DAPTWB (ug/L)	DAPTLR (ug/L)	DAPTLB (ug/L)	DAPTHE (ug/L)
17-Oct-97	7.6 DT	9.3 DT	- -	5.2 DT	2 DT**
28-Oct-98	57.0 DT	68.0 DT	63.0 DT	77.0 DT	- -
23-Jun-99	96.0 DT	81.0 DT	117.0 DT	81.0 DT	- -
17-Apr-00	29.0 ST	30.0 ST	38.0 ST	33.0 ST	33.0 ST
19-Apr-00	29.0 ST	26.0 ST	22.0 ST	24.0 ST	22.0 ST
21-Apr-00	39.0 ST	37.0 ST	32.0 ST	35.0 ST	31.0 ST
24-Jan-01	3.5 ST	1.0 ST*	1.0 ST*	1.0 ST*	1.0 ST*
26-Jan-01	1.0 ST*	3.1 ST	1.0 ST*	2.4 ST	7.3 ST
28-Jan-01	8.7 ST	11.0 ST	17.0 ST	8.8 ST	1.0 ST*
26-Feb-01	8.1 ST	22.0 ST	1.0 ST*	1.0 ST*	1.0 ST*
28-Feb-01	1.0 ST*	1.0 ST*	1.0 ST*	1.0 ST*	1.0 ST*
2-Mar-01	1.0 ST*	1.0 ST*	1.0 ST*	1.0 ST*	1.0 ST*
17-Apr-00	27.0 SF	28.0 SF	26.0 SF	30.0 SF	21.0 SF
19-Apr-00	27.0 SF	25.0 SF	21.0 SF	22.0 SF	20.0 SF
21-Apr-00	39.0 SF	37.0 SF	35.0 SF	40.0 SF	30.0 SF
24-Jan-01	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*
26-Jan-01	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*	2.0 SF
28-Jan-01	3.2 SF	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*
26-Feb-01	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*
28-Feb-01	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*
2-Mar-01	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*	1.0 SF*

* = Value reported as "<2.0" ** = Value reported as "<4.0"
DT = Dry, Total (total recoverable)
SF = Storm, Filtered (dissolved) ST = Storm, Total (total recoverable)

Summary Statistics

SF (storm, filtered)					
Avg =	11.2	10.7	9.8	10.9	8.7
Median =	1.0	1.0	1.0	1.0	1.0
Std Dev =	15.2	14.8	13.6	15.5	11.6

Lab QA / QC Concerns

The County of Orange's contracted lab used EPA Method 200.8, an ICP/MS method commonly used for the detection of dissolved copper in drinking water. This method directs the analyst to correct for problems known to occur due to salt matrix interference. Phone conversations with lab managers at the contracted laboratory verified that salt matrices are not removed prior to testing. Therefore, it is likely that the data reported in Table 1 are incorrect.

EPA Region 9 has started an intercalibration study with several laboratories, including the County of Orange's contracted lab. The goal was to evaluate accuracy and recovery of metals within seawater and estuarine samples. The standard reference materials, which contain known concentrations of metals, come from the National Research Council of Canada (NRCC). The NRCC and County of Orange's results for the same concentration of copper are presented in Table 2. Comparison of the results show the

County of Orange's contracted lab to report much higher concentrations than the NRCC and provides evidence of the over estimation of dissolved copper when salt matrices are not removed. To date, limited data from this intercalibration study were reported and can be compared. While this preliminary quality assurance check suggests the contracted lab cannot produce a reliable dissolved copper result in seawater, the evidence presented is not so compelling that the data is considered invalid. Strong and conclusive evidence must be presented before a data set is disregarded. However, the data from the contracted lab must be viewed with caution.

Table 2: Split Sample Copper Concentrations

Sample ID	NRCC* Cu (mg/L)	Orange Co. Result Cu (mg/L)
35 ppt salinity	0.517	<2.0
15 ppt salinity	1.55	5.0
7 ppt salinity	0.71	9.6
<2 ppt salinity	1.81	5.3

*NRCC = National Research Council Canada standard reference material

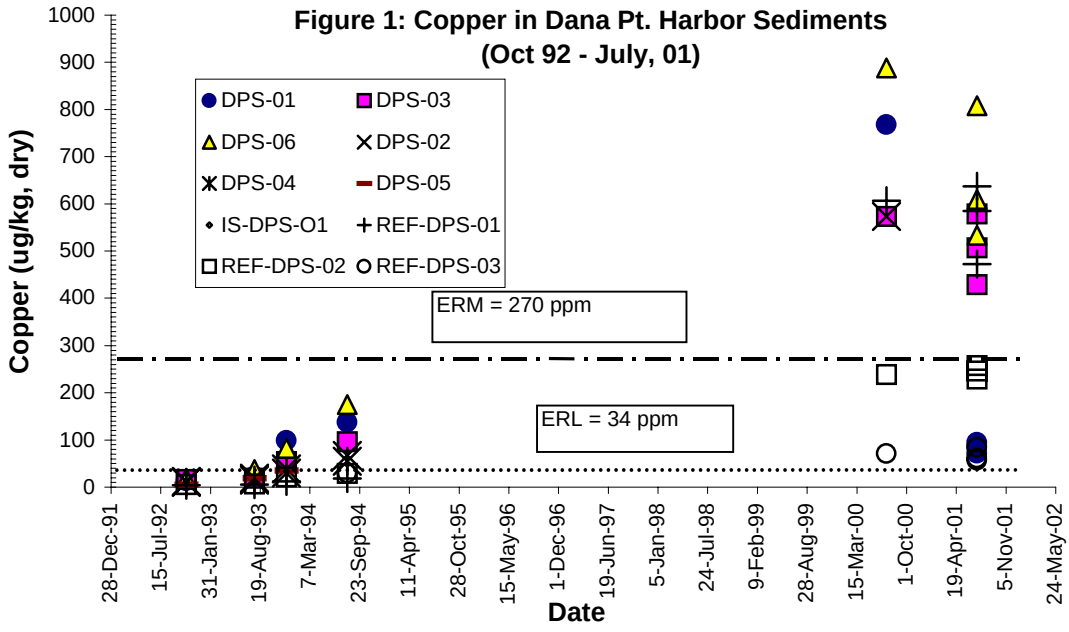
Sediment Copper Concentrations

Sediment copper concentration data is available and helps in understanding the copper situation in Dana Point Harbor[6]. Sediment copper concentrations are not the basis for this listing decision, but add to the weight of evidence and confirm that copper is present in the harbor at levels sufficient to accumulate in sediment. Sediment copper is measured as total copper and has been collected by the Dana Point Shipyard. The laboratory contracted by Orange Co. was not one of the laboratories that analyzed these sediment samples for copper. Sample locations exist adjacent to the shipyard and at three reference sites within the harbor. Data is available for October 1992 to August 1994, July of 2000 and July of 2001 (Table 3). The earlier dates have much lower concentrations that occasionally exceed the ERM, but never exceed the more stringent ERL criteria (Figure 1). The samples taken during 2000 and 2001 indicate that 25 of 25 samples (100%) exceeded the ERL and 14 of 25 (56%) exceeded the ERM (Figure 2). For all samples and dates, 37 of 62 (60%) samples exceeded the ERL and 18 of 62 (29%) exceeded the ERM.

Table 3: Sediment Copper Concentrations in Dana Point Harbor

	Station									
	DPS-01	DPS-02	DPS-03	DPS-04	DPS-05	DPS-06	REF-DPS-01	REF-DPS-02	REF-DPS-03	IS-DPS-01
	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper
Sampling Date	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry	(mg/kg) dry
26-Oct-92	13.8	12	16	10.1	5.6	18.1	3.8	5.6	-	10.4
27-Jul-93	23	19	19	15	19	37	5.1	6.6	-	12
3-Dec-93	99	39	54	30	35	82	12	22	-	33
4-Aug-94	138	67	96	55	41	175	18	29	30	49
12-Jul-00	768	573	573	-	-	888	606.5	238.7	71.3	-
11-Jul-01	72	-	579	-	-	533	585	229	57	-
11-Jul-01	95	-	429	-	-	609	472	258	62	-
11-Jul-01	86	-	507	-	-	808	637	246	84	-

(-) = not sampled



Best Professional Judgement

Knowledge of the inherent nature of anti-fouling copper paints used on boat hulls is also considered evidence. By their very design, these paints leach copper into the surrounding water as a means of controlling bio-fouling organisms. In an area of high boat densities, such as Dana Point Harbor, it is likely that the aquatic environment contains high dissolved copper concentrations. Perhaps for more than any other listing, this type of anecdotal evidence must be considered and weigh strongly in favor of 303(d) listing.

Summary of Evidence of Impairment

Copper is a commonly used pesticide in anti-fouling paints used on ocean vessels. There is only limited direct evidence of elevated dissolved copper concentrations in Dana Point Harbor. One storm event resulted in all the direct evidence of exceedances and there is limited evidence that the data may not be valid due to analytical errors at the contracted laboratory. However, during the one storm event, 100% of the samples exceeded the CMC by a large margin. Considering all three-storm events, one-third of the samples exceeded the CMC. In addition, total copper concentrations are now above the ERM at over half the stations sampled and exceed the ERL at all the stations. Finally, the intrinsic nature of a marina filled with boats that are coated with copper based anti fouling paints provides additional evidence that Dana Point Harbor has a dissolved copper problem. All of these lines of evidence constitute the weight of evidence that leads to the conclusion that the aquatic life beneficial uses of Dana Point Harbor are likely to be impaired due to elevated copper concentrations in the water column.

All of the above violations are expected to impair the WILD, RARE, MAR, MIGR, SPWN and SHELL beneficial uses.

EXTENT OF IMPAIRMENT

Copper (dissolved) The 5 water column sampling stations are distributed through out the entire harbor, including the mouth. The sediment sampling stations are also distributed through out the harbor. Finally, ships coated with copper-based anti-fouling paints are docked through out the harbor. Therefore, the entire harbor is listed as impaired for dissolved copper.

POTENTIAL SOURCES

Copper (dissolved) The California Regional Water Quality Control Board, San Diego Region's Draft Copper TMDL (Total Maximum Daily Load)[7] has identified recreational boats as the major source of copper contamination to marina waters in San Diego Bay. This ongoing TMDL addresses elevated concentrations of dissolved copper in the Shelter Island Yacht Basin portion of San Diego Bay. Urban runoff is also considered a potential source.

TMDL PRIORITY

Copper (dissolved) Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

[2] California Toxics Rule (Federal Register, 40 CFR, Part 131, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California), May, 2000. Environmental Protection Agency.

[3] National Oceanic and Atmospheric Administration, 2000. Sediment Quality Guidelines. Office of Response and Restoration. http://response.restoration.noaa.gov/cpr/sediment/SQGs.html

[5] Environmental Protection Agency, 1993. The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion. EPA 823-B-96-007.

[7] California Regional Water Quality Control Board, San Diego Region, 2001. Draft Staff Report for Copper TMDL in Shelter Island Yacht Basin. December 2001.

Data Sources

[4] NPDES Annual Progress Report, County of Orange. November, 2000. Orange County Board of Supervisors. California Regional Water Quality Control Board, San Diego Region: Order No. 96-03.

[6] Burns and McDonnell Engineers, 2001. Annual Sediment Sampling Report for Dana Point Shipyard. Project Number 23879. San Diego, CA. In compliance with California Regional Water Quality Control Board, San Diego Region Order No. 2000-212.

PRIMA DESHECHA CREEK
Hydrologic Subarea 901.31

NEW 303(d) LISTINGS
Phosphorus and Turbidity

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Prima Deshecha Creek is an approximately 6.20 mile waterway in the San Juan Watershed of Region 9. It drains directly into the Pacific Ocean. It is classified as inland surface water with the following beneficial uses: AGR, REC1 (designated potential), REC2, WARM and WILD[1].

WATER QUALITY OBJECTIVES NOT ATTAINED
Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus (P) is 0.1 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

Turbidity The Basin Plan[1] objective is 20 NTU (Nephelometric Turbidity Units). This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Phosphorus Data, collected between July 1997 and June 2000 contained in the County of Orange NPDES Annual Progress Report[2], shows exceedance of the Basin Plan objective of 0.1 mg/L for more than 10% of the time during a one-year period. From July 1997 to June 1998, 13 of 16 samples (81%) exceeded the objective, with a mean of 1.01 mg/L and a median of 0.51 mg/L. From August 1998 to July 1999, 24 of 29 samples (83%) exceeded the objective, with a mean of 0.69 mg/L and a median of 0.33 mg/L. From October 1999 to June 2000, 9 of 9 samples (100%) exceeded the objective, with a mean of 1.37 mg/L and a median of 0.53 mg/L. It should be noted that the majority of the sampling occurred during the months of January, February, March and November. This time is generally considered to be the rainy season in San Diego. See figure below that graphs phosphorus concentration against time of year.

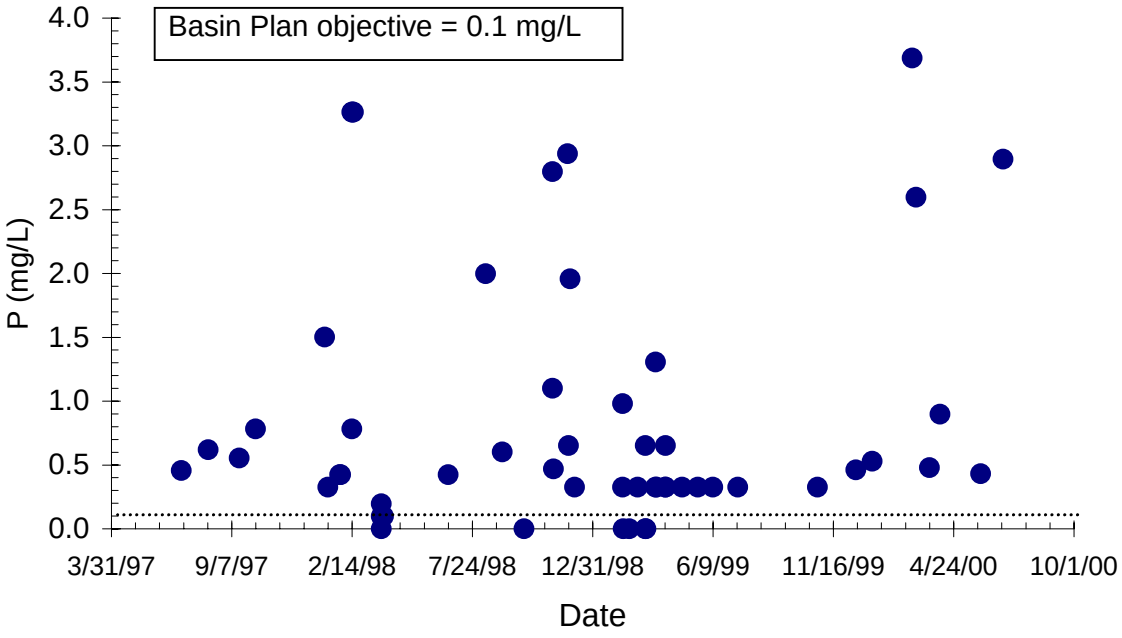
These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that may impair the REC1, REC2, WARM and WILD beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

Turbidity Data collected between July 1997 and June 2000 contained in the County of Orange NPDES Annual Progress Report[2] shows exceedance of the Basin Plan objective of 20 NTU more than 10% of the time during a one-year period. From July 1997 to June 1998, 14 of 16 samples (88%) exceeded the objective, with a mean of 553.3 NTU and a median of 155.0 NTU. From August 1998 to July 1999, 18 of 29 samples (62%) exceeded the objective, with a mean of 268.3 NTU and median of 58.0 NTU. From October 1999 to June 2000, 9 of 9 samples (100%) exceeded the objective, with a mean of 962.4 NTU and a median of 110.0 NTU. It should be noted that the majority of the sampling occurred during the months of January, February, March and

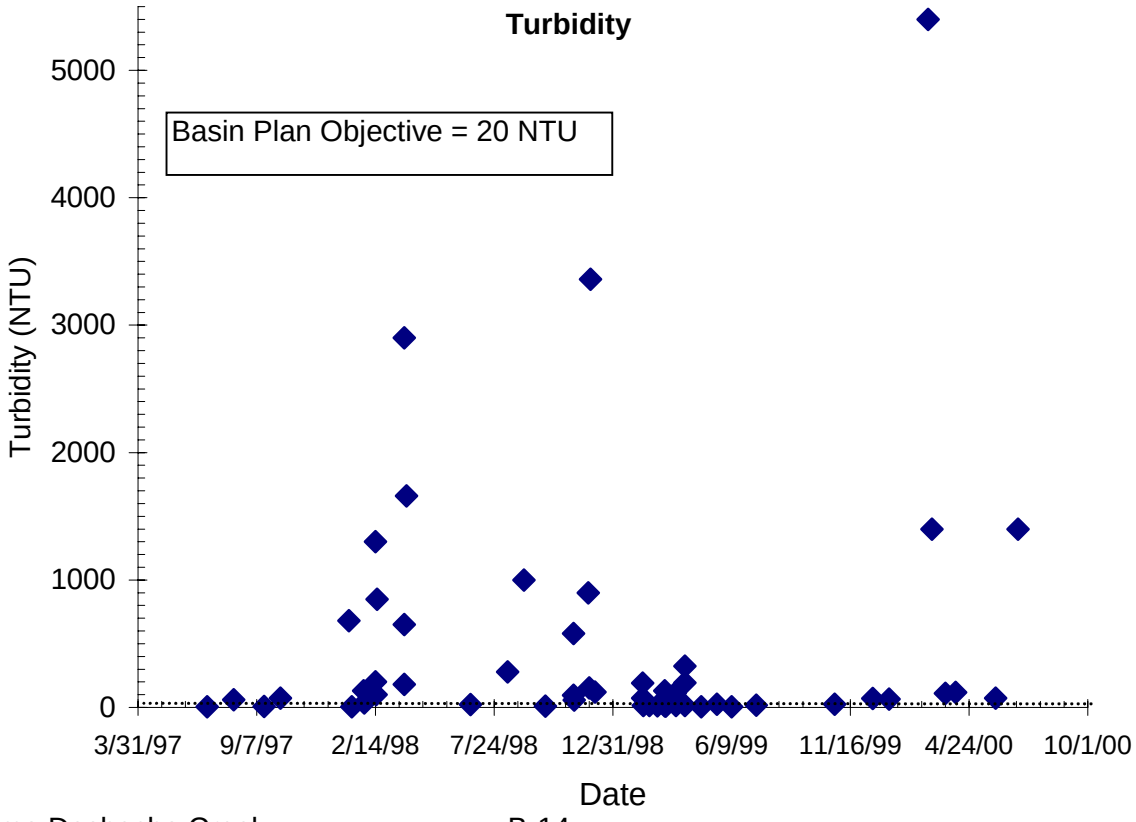
November. This time is generally considered to be the rainy season in San Diego. See figure below that graphs turbidity against time of year.

Prima Deshecha Creek - NPDES Data

Phosphorus



Turbidity



High turbidity can decrease the penetration of light into the water column and adversely affect photosynthesis which aquatic organisms depend upon for survival. High concentrations of particulate matter that produce turbidity can be directly lethal to aquatic life. This may impair the WARM and WILD beneficial uses of this water body.

EXTENT OF IMPAIRMENT

Phosphorus Sampling occurred at site PDCM01, which is near the mouth of the creek. The specific standards exceeded are most likely due to cumulative effects throughout the waterbody, but the data is for only one site. The extent of impairment is from 1/2 mile upstream of the station, down to the mouth of the Creek. This covers approximately the lower 1-mile of the creek.

Turbidity Sampling occurred at site PDCM01, which is near the mouth of the creek. The specific standards exceeded are most likely due to cumulative effects throughout the waterbody, but the data is for only one site. The extent of impairment is from 1/2 mile upstream of the station, down to the mouth of the Creek. This covers approximately the lower 1-mile of the creek.

POTENTIAL SOURCES

Phosphorus Urban runoff, other point sources and non-point sources

Turbidity Most of Prima Deshecha Creek runs through highly urbanized areas that have seen tremendous growth in recent years. Channalization of the stream has probably increased water velocity that could be causing the undercutting of banks and increasing turbidity. Recent and past construction activities may also have contributed.

TMDL PRIORITY

Phosphorus Low

Turbidity Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] NPDES Annual Progress Report, County of Orange. November, 2000. Orange County Board of Supervisors. California Regional Water Quality Control Board, San Diego Region: Order No. 96-03.

SEGUNDA DESHECHA CREEK
Hydrologic Subarea 901.32

NEW 303(d) LISTINGS
Phosphorus and Turbidity

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Segunda Deshecha Creek is an approximately 5.6 mile waterway in the San Juan Watershed of Region 9. It drains directly into the Pacific Ocean. It is classified as inland surface water with the following beneficial uses: AGR, REC1 (designated potential), REC2, WARM and WILD[1].

WATER QUALITY OBJECTIVES NOT ATTAINED
Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus (P) is 0.1 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

Turbidity The Basin Plan[1] objective is 20 NTU (Nephelometric Turbidity Units). This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Phosphorus Data collected between August 1997 and June 2000 contained in the County of Orange NPDES Annual Progress Report[2] shows exceedance of the Basin Plan objective of 0.1 mg/L for more than 10% of the time during a one-year period. From August 1997 to August 1998, 13 of 16 samples (81%) exceeded the objective, with a mean of 0.73 mg/L and a median of 0.33 mg/L. From September 1998 to July 1999, 15 of 20 samples (75%) exceeded the objective, with a mean of 0.25 mg/L and a median of 0.21 mg/L. From October 1999 to June 2000, 6 of 7 samples exceeded the objective, with a mean of 0.37 mg/L and median of 0.35 mg/L. It should be noted that the majority of the sampling occurred during the months of January, February, March and April. This time is generally considered to be the rainy season in San Diego. See figure below that graphs phosphorus concentration against time of year.

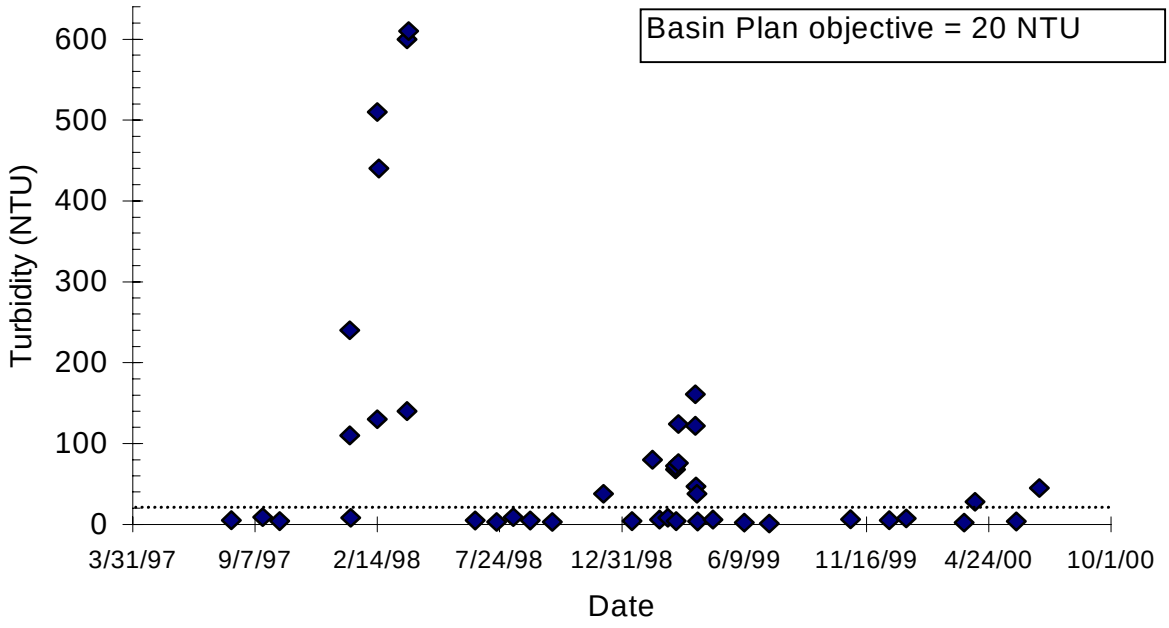
These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that would impair the REC1, REC2, WARM and WILD beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

Turbidity Data collected between August 1997 and June 2000 contained in the County of Orange NPDES Annual Progress Report[2] shows exceedance of Basin Plan objective of 20 NTU for more than 10% of the time during a one-year period. From August 1997 to August 1998, 9 of 16 samples (56%) exceeded the objective, with a mean of 295.2 NTU and a median of 120.0 NTU. From September 1998 to July 1999, 10 of 20 samples (50%) exceeded the objective, with a mean of 43.4 NTU and a median of 23.0 NTU. From October 1999 to June 2000, 2 of 7 samples exceeded the objective, with a mean of 14.0 NTU and median of 6.2 NTU. It should be noted that the majority of

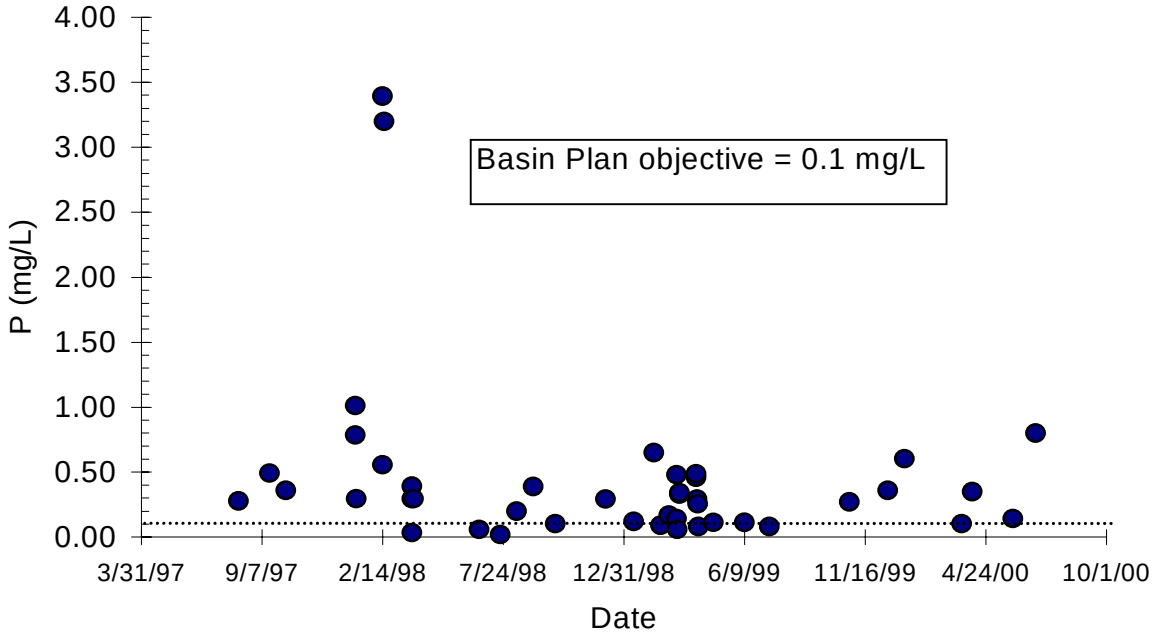
the sampling occurred during the months of January, February, March and April. This time is generally considered to be the rainy season in San Diego. See the figure above that graphs turbidity against time of year.

Segunda Deshecha Creek - NPDES Data

Turbidity



Phosphorus



High turbidity can decrease the penetration of light into the water column and adversely affect photosynthesis which aquatic organisms depend upon for survival. High concentrations of particulate matter that produce turbidity can be directly lethal to aquatic life. This would impair the WARM and WILD beneficial uses of this water body.

EXTENT OF IMPAIRMENT

Phosphorus Sampling occurred at site SDCM01, which is near the mouth of the creek. The specific standards exceeded are most likely due to cumulative effects throughout the waterbody, but the data is for only one site. Therefore, the extent of impairment is from 1/2 mile upstream of the station, down to the mouth of the Creek. This covers approximately the lower 1-mile of the creek.

Turbidity Sampling occurred at site SDCM01, which is near the mouth of the creek. The specific standards exceeded are most likely due to cumulative effects throughout the waterbody, but the data is for only one site. Therefore, the extent of impairment is from 1/2 mile upstream of the station, down to the mouth of the Creek. This covers approximately the lower 1-mile of the creek.

POTENTIAL SOURCES

Phosphorus Urban runoff, other point sources and non-point sources

Turbidity Most of Segunda Deshecha Creek runs through highly urbanized areas that have seen tremendous growth in recent years. Channalization of the stream has probably increased water velocity that could be causing the undercutting of banks and increasing turbidity. Recent and past construction activities may also have contributed.

TMDL PRIORITY

Phosphorus Low

Turbidity Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] NPDES Annual Progress Report, County of Orange. November, 2000. Orange County Board of Supervisors. California Regional Water Quality Control Board, San Diego Region: Order No. 96-03.

SANDIA CREEK
Hydrologic Subarea 902.22

NEW 303(d) LISTINGS

Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

Santa Margarita Hydrologic Unit is a rectangular area of approximately 750 square miles. It includes portions of US Marine Corps' Camp Pendleton, as well as the civilian populations of Murrieta, Temecula, and part of Fallbrook. The Santa Margarita Hydrologic Unit is comprised of the following nine hydrologic areas: the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga and Oak Grove Hydrologic Areas. Annual precipitation ranges from less that 12 inches near the coast to more than 45 inches inland near Palomar Mountain. The major surface water storage areas are Vail Lake and O'Neil Lake.[1]

Santa Margarita Hydrologic Unit is drained largely by the Santa Margarita River, Murrieta Creek and the Temecula Creek. The Santa Margarita flows approximately 27 miles from the confluence of Temecula Creek and Murrieta Creek toward the Pacific Ocean to the Santa Margarita Lagoon, which lies within the Camp Pendleton Naval Reservation of the US Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar. The Santa Margarita River provides groundwater recharge to Camp Pendleton's only domestic water supply. [1,2]

Sandia Creek is located near Fallbrook and flows from the north into Santa Margarita River just downstream from the Rainbow Creek confluence with the Santa Margarita. Beneficial Uses include: MUN, AGR, IND, REC1, REC2, WARM, COLD and WILD.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED

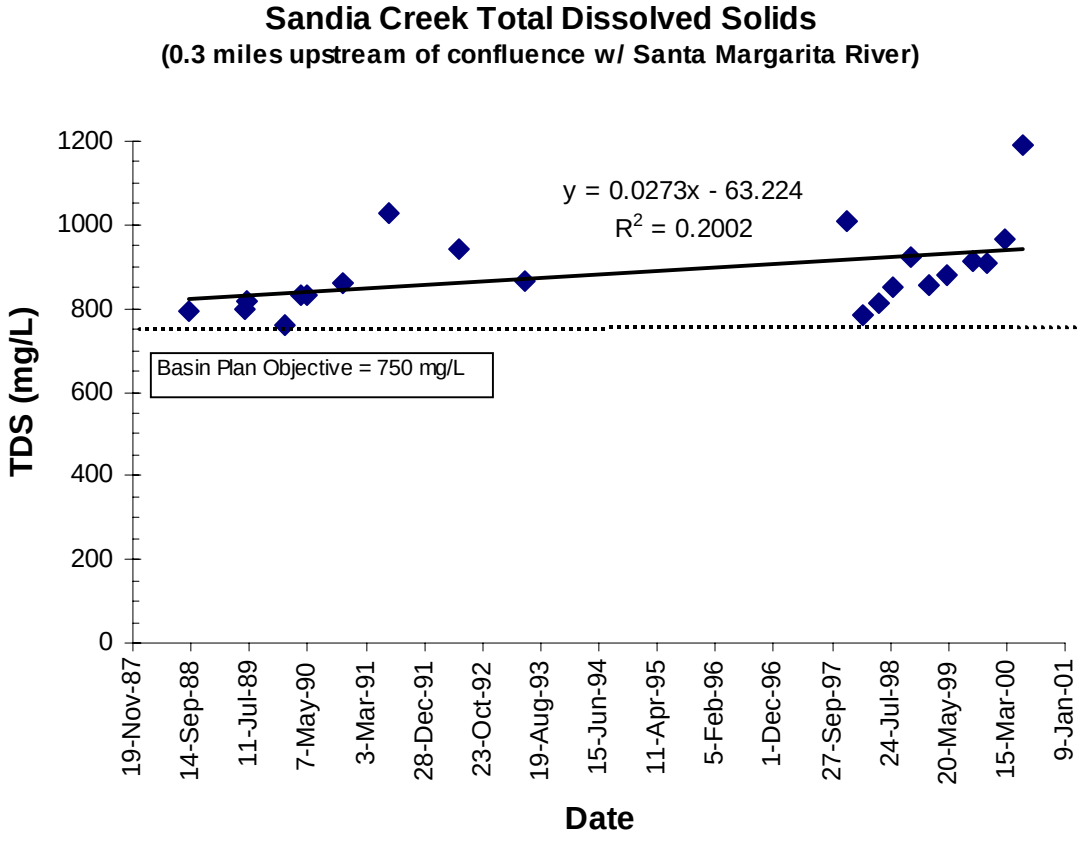
TDS The Basin Plan[1] objective for TDS is 750 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT

TDS Quarterly sampling collected, compiled and analyzed by Camp Pendleton[2] from 1997 to 2000 at 0.3 miles upstream of the confluence with the Santa Margarita River, show exceedance of the Basin Plan objective more than 10% of the time during a one-year period. From December 1997 to November 1998, 5 of 5 samples (100%) exceeded the objective, with a mean of 877.0 mg/L and a median of 850.0 mg/L. From February 1999 to December 1999, 4 of 4 samples (100%) exceeded the objective, with a mean of 888.5 mg/L and median of 893.5 mg/L. In March and June of 2000, 2 of 2 samples (100%) exceeded the objective, with a mean and median of 1078.0 mg/L. Graphical presentation of the data from 1987 to 2000[2] display increasing concentrations of TDS, indicating a decrease in water quality (see figure below).

Sampling of TDS, by the Regional Board[3] in June of 1998, also show Sandia Creek to have concentrations above the Basin Plan objective. The concentration in Sandia Creek at Sandia Creek Rd was 817 mg/L.

TDS may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.). Geologic conditions help to define the natural levels of many of these constituents. Imported water is known to have high levels of TDS. Most of the problem can be traced to human impacts, and therefore, can be mitigated. High TDS concentrations may be expected to impair the MUN beneficial use[1]. High concentrations of TDS are also expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1].



EXTENT OF IMPAIRMENT

TDS Sampling occurred at two stations. One near the confluence with the Santa Margarita River and another approximately 1 mile upstream. The extent of impairment is the lower 1.5 miles of the stream.

POTENTIAL SOURCES

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Imported water, evaporation and natural salt sources also contribute. Other sources include urban runoff, agriculture runoff, other point sources and non-point sources.

TMDL PRIORITY

TDS Low (There are current and extensive efforts underway to address water quality issues in the Santa Margarita Watershed.[4] Various stakeholders have recognized and identified some existing and potential water quality issues and are attempting to gain a better understanding, conduct more monitoring, target pollutant sources and develop comprehensive management strategies. TMDLs would provide the legal framework necessary to address some of these problems and could assist in this coordinated effort and be a major component of this work.)

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Final Report of Water Quality Studies & Proposed Watershed Monitoring Program for Portions of San Mateo & Santa Margarita River Watershed. Marine Corps Base, Camp Pendleton, CA. Contract No. N68711-95-D-7573, D.O. 0021.

[3] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region.

[4] DRAFT Framework Monitoring Plan for the Santa Margarita Watershed California. US Bureau of Reclamation. CDM Federal Corp., Boyle Engr. Corp. RECON. Feb 2001.

SANTA MARGARITA RIVER, Upper
Hydrologic Subarea 902.22

NEW 303(d) LISTINGS
Phosphorus

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Santa Margarita Hydrologic Unit is a rectangular area of approximately 750 square miles. It includes portions of US Marine Corps' Camp Pendleton, as well as the civilian populations of Murrieta, Temecula, and part of Fallbrook. The Santa Margarita Hydrologic Unit is comprised of the following nine hydrologic areas: the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga and Oak Grove Hydrologic Areas. Annual precipitation ranges from less that 12 inches near the coast to more than 45 inches inland near Palomar Mountain. The major surface water storage areas are Vail Lake and O'Neil Lake.[1]

Santa Margarita Hydrologic Unit is drained largely by the Santa Margarita River, Murrieta Creek and the Temecula Creek. Murrieta Creek flows southeasterly from the northern slope of the Santa Rosa Plateau to the confluence with the Temecula Creek to form the Santa Margarita River The Santa Margarita then flows approximately 27 miles to the Pacific Ocean. The coastal Santa Margarita Lagoon is at the mouth and lies within the Camp Pendleton Naval Reservation of the US Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar.[1] The Santa Margarita River provides groundwater recharge to Camp Pendleton's only domestic water supply. [1,2]

The Santa Margarita is divided into lower and upper reaches as defined by the confluence of the DeLuz Creek.

Designated beneficial uses for the Santa Margarita River include MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, and RARE.[1]

WATER QUALITY OBJECTIVE NOT ATTAINED
Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus is 0.1 mg/L for flowing surface waters. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Phosphorus Quarterly sampling collected, compiled and analyzed by Camp Pendleton[2] from 1997 to 2000 shows two sites along the river to have elevated concentrations of phosphorus that exceeded the Basin Plan objective more than 10% of the time during a one-year period. Near Temecula, from December 1997 to November 1998, 4 of 5 samples (80%) exceeded the objective, with a mean of 0.24 mg/L and a median of 0.25 mg/L. In February and May of 1999, 1 of 2 samples (50%) exceeded the objective, with a mean and median of 0.17 mg/L. Near Fallbrook, from December 1997 to November 1998, 4 of 5 (80%) samples exceeded the objective, with a mean of 0.25

mg/L and a median of 0.26 mg/L. In February and May of 1999, 1 of 2 samples (50%) exceeded the objective, with a mean and median of 0.12 mg/L.

Sampling of phosphate (as phosphorus) by the Regional Board[3] in June of 1998 also showed the Upper Santa Margarita River to have concentrations above the Basin Plan objective. The concentration at Willow Glen Road was 0.62 mg/L. The concentration at Deluz / Pico Road was 0.35 mg/L.

Sampling by the Rancho California Water District[4] from March to December 2000 showed two locations to exceed the Basin Plan objective for more than 10% of the time during the year. At Santa Margarita River at Willow Glen Road, 1 of 8 samples (13%) exceeded the objective, with a mean of 0.029 mg/L and a median of 0.0 mg/L. At De Luz Rd, 1 of 6 samples (17%) exceeded the objective, with a mean of 0.043 mg/L and a median of 0.025 mg/L. All non-detects were considered to be 0.0 mg/L for statistical purposes.

These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that may impair the MUN, REC1, REC2, WARM, COLD WILD and RARE beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

EXTENT OF IMPAIRMENT

Phosphorus Phosphorus concentrations exceeded the Basin Plan objective at all 4 stations sampled along the upper reach of the Santa Margarita River. Therefore, the entire upper reach (17.5 miles) is listed.

POTENTIAL SOURCES

Phosphorus Urban runoff, agriculture runoff, other point sources and non-point sources.

TMDL PRIORITY

Phosphorus Low (There are current and extensive efforts underway to address water quality issues in the Santa Margarita Watershed.[5] Various stakeholders have recognized and identified some existing and potential water quality issues and are attempting to gain a better understanding, conduct more monitoring, target pollutant sources and develop comprehensive management strategies. TMDLs would provide the legal framework necessary to address some of these problems and could assist in this coordinated effort and be a major component of this work.)

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Final Report of Water Quality Studies & Proposed Watershed Monitoring Program for Portions of San Mateo & Santa Margarita River Watershed. Marine Corps Base, Camp Pendleton, CA. Contract No. N68711-95-D-7573, D.O. 0021.

[3] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region.

[4] Annual Receving Water Monitoring Data. CA Department of Water Resources. G. Gilbreath. 1998-2000.

[5] DRAFT Framework Monitoring Plan for the Santa Margarita Watershed California. US Bureau of Reclamation. CDM Federal Corp., Boyle Engr. Corp. RECON. Feb 2001.

MURRIETA CREEK
Hydrologic Subarea 902.52

NEW 303(d) LISTINGS
Phosphorus

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Santa Margarita Hydrologic Unit is a rectangular area of approximately 750 square miles. It includes portions of US Marine Corps' Camp Pendleton, as well as the civilian populations of Murrieta, Temecula, and part of Fallbrook. The Santa Margarita Hydrologic Unit is comprised of the following nine hydrologic areas: the Ysidora, Deluz, Murrieta, Auld, Pechanga, Wilson, Cave Rocks, Aguanga and Oak Grove Hydrologic Areas. Annual precipitation ranges from less that 12 inches near the coast to more than 45 inches inland near Palomar Mountain. The major surface water storage areas are Vail Lake and O'Neil Lake.[1]

The Santa Margarita Hydrologic Unit is drained largely by the Santa Margarita River, Murrieta Creek and the Temecula Creek. Murrieta Creek flows southeasterly from the northern slope of the Santa Rosa Plateau to the confluence with the Temecula Creek to form the Santa Margarita River. The Santa Margarita then flows approximately 27 miles toward the Pacific Ocean to the coastal Santa Margarita Lagoon which lies at the mouth and within the Camp Pendleton Naval Reservation of the US Marine Corps. The slough at the mouth of the river is normally closed off from the ocean by a sandbar.[1]

The Santa Margarita River provides groundwater recharge to Camp Pendleton's only domestic water supply. [1,2]

Beneficial Uses of Murrieta Creek include: MUN, AGR, IND, PROC, GWR, REC1 (designated potential), REC2, WARM and WILD.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED
Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus is 0.1 mg/L for flowing surface waters. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Phosphorus Quarterly sampling collected, compiled and analyzed by Camp Pendleton[2] from 1997 to 2000 at 0.4 miles upstream of the confluence with Temecula Creek, show exceedance of the Basin Plan objective for more than 10% of the time during a one-year period. From December 1997 to November 1998, 4 of 5 samples (80%) exceeded the objective, with a mean of 0.28 mg/L and a median of 0.27 mg/L. In February and May of 1999, 2 of 2 samples (100%) exceeded the objective, with a mean and median of 0.21 mg/L.

Sampling of phosphate (as phosphorus) by the Regional Board[3] in June of 1998 showed one of two sites to have a concentration above the Basin Plan[1] objective of 0.1 mg/L.

The concentration in Murrieta Creek at Calle Del Oso Oro Rd was 0.28 mg/L and the concentration in Murrieta Creek behind the cement factory at Front Street was 0.06 mg/L.

These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that may impair the REC1, REC2, WARM, COLD and WILD beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

EXTENT OF IMPAIRMENT

Phosphorus The station sampled by Camp Pendleton[2] was located 0.4 miles upstream of the confluence with Temecula Creek. The station sampled by the Regional Board[3] that showed an elevated concentration was located at Calle Del Oso Oro Road and is near the beginning of the stream. Therefore, the entire reach (1.8 miles) should be listed.

POTENTIAL SOURCES

Phosphorus Urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Phosphorus Low (There are current and extensive efforts underway to address water quality issues in the Santa Margarita Watershed.[4] Various stakeholders have recognized and identified some existing and potential water quality issues and are attempting to gain a better understanding, conduct more monitoring, target pollutant sources and develop comprehensive management strategies. TMDLs would provide the legal framework necessary to address some of these problems and could assist in this coordinated effort and be a major component of this work.) Currently, there is ongoing development of a TMDL addressing the elevated levels of nitrogen and phosphorus in Rainbow Creek.[5]

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Final Report of Water Quality Studies & Proposed Watershed Monitoring Program for Portions of San Mateo & Santa Margarita River Watershed. Marine Corps Base, Camp Pendleton, CA. Contract No. N68711-95-D-7573, D.O. 0021.

[3] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region.

[4] DRAFT Framework Monitoring Plan for the Santa Margarita Watershed California. US Bureau of Reclamation. CDM Federal Corp., Boyle Engr. Corp. RECON. Feb 2001.

[5] SDRWQCB, 2001. Draft Staff Report for Nutrient Total Maximum Daily Load for Rainbow Creek. October 19, 2001.

SAN LUIS REY RIVER
Hydrologic Subarea 903.11 & 903.12

NEW 303(d) LISTINGS

Chloride and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

The San Luis Rey River is located in the San Luis Rey Watershed in the north end of San Diego County, California. The San Luis Rey River originates from Lake Henshaw. In the lower segment, it runs parallel to Highway 76 all the way to the City of Oceanside, where it enters the Pacific Ocean adjacent to Oceanside Harbor.

The San Luis Rey River is classified an inland surface water. It is designated with the following beneficial uses: AGR, IND, REC1, REC2, WARM, WILD and RARE[1].

WATER QUALITY OBJECTIVES NOT ATTAINED

Chloride The Basin Plan[1] objective is 250 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

TDS The Basin Plan[1] objective is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT

Chloride Data collected in October 1997 to November 2000 by the City of Oceanside Water Utilities Laboratory[2] showed 3 locations along the San Luis Rey River to exceed 250 mg/L more than 10% of the time during a one-year period. Three locations in the City of Oceanside were sampled quarterly for chloride. At Bonsall Bridge, 1 of 3 samples (33%) exceeded the objective from October 1997 to June 1998, with a mean of 281.0 mg/L and a median of 216.0 mg/L. From September 1998 to September 1999, 3 of 3 samples (100%) exceeded the objective, with a mean of 321.0 mg/L and a median of 297.0 mg/L. From December 1999 to November 2000, 4 of 5 samples (80%) exceeded the objective, with a mean of 314.0 mg/L and a median of 330.0 mg/L. At Douglas Bridge, 2 of 4 samples (50%) exceeded the objective from October 1997 to September 1998, with a mean of 272.5 mg/L and a median of 266.0 mg/L. From March 1999 to September 1999, 2 of 2 samples (100%) exceeded the objective with a mean and median of 310.5 mg/L. From April 2000 to November 2000, 3 of 4 samples (75%) exceeded the objective, with a mean of 312.5 mg/L and a median of 325.0 mg/L. At Benet Road 2 of 4 samples (50%) exceeded the objective from October 1997 to September 1998, with a mean of 401.5 mg/L and a median of 287.5 mg/L. In March and December of 1999, 2 of 2 samples (100%) exceeded the objective, with a mean and median of 444.5 mg/L. From April 2000 to November 2000, 4 of 4 samples exceeded the objective, with a mean of 410.0 mg/L and a median of 380.0 mg/L. See graph below for chloride concentrations plotted against time.

Elevated concentrations in waters used for industrial process and supply can significantly increase the corrosion rate of steel and aluminum. The observed concentrations may be impairing the IND beneficial use.

High chloride concentrations can be toxic to plant life. A safe concentration of chloride of irrigation waters is considered to be in the range of 100 – 140 mg/L. Irrigation with water containing 140 – 350 mg/L of chloride may cause slight to moderate plant injury.[1] The measured concentrations can be expected to impair the AGR beneficial use. Damage to native flora could also impair the WARM, WILD and RARE beneficial uses.

TDS Data collected in October 1997 to November 2000 by the City of Oceanside Water Utilities Laboratory[2] showed 3 locations along the San Luis Rey River to exceed 500 mg/L more than 10% of the time during a one-year period. Three locations in the City of Oceanside were sampled quarterly. At Bonsall Bridge, 3 of 3 samples (100%) exceeded the objective from October 1997 to June 1998, with a mean of 1577 mg/L and a median of 1700 mg/L. From September 1998 to September 1999, 3 of 3 samples (100%) exceeded the objective, with a mean of 1512.7 mg/L and a median of 1400 mg/L. From December 1999 to November 2000, 5 of 5 samples (100%) exceeded the objective, with a mean of 1694 mg/L and a median of 1680 mg/L. At Douglas Bridge, 4 of 4 samples (100%) exceeded the objective from October 1997 to September 1998, with a mean of 1328 mg/L and a median of 1330 mg/L. From March 1999 to September 1999, 2 of 2 samples (100%) exceeded the objective with a mean and median of 1466 mg/L. From April 2000 to November 2000, 4 of 4 samples (100%) exceeded the objective, with a mean of 1613 mg/L and a median of 1620 mg/L. At Benet Road 4 of 4 samples (100%) exceeded the objective from October 1997 to September 1998, with a mean of 1572 mg/L and a median of 1269 mg/L. From March 1999 to December 1999, 2 of 2 samples (100%) exceeded the objective, with a mean and median of 1695 mg/L. From April 2000 to November 2000, 4 of 4 samples exceeded the objective, with a mean of 1835 mg/L and a median of 1850 mg/L. See graph below for TDS concentrations plotted against time.

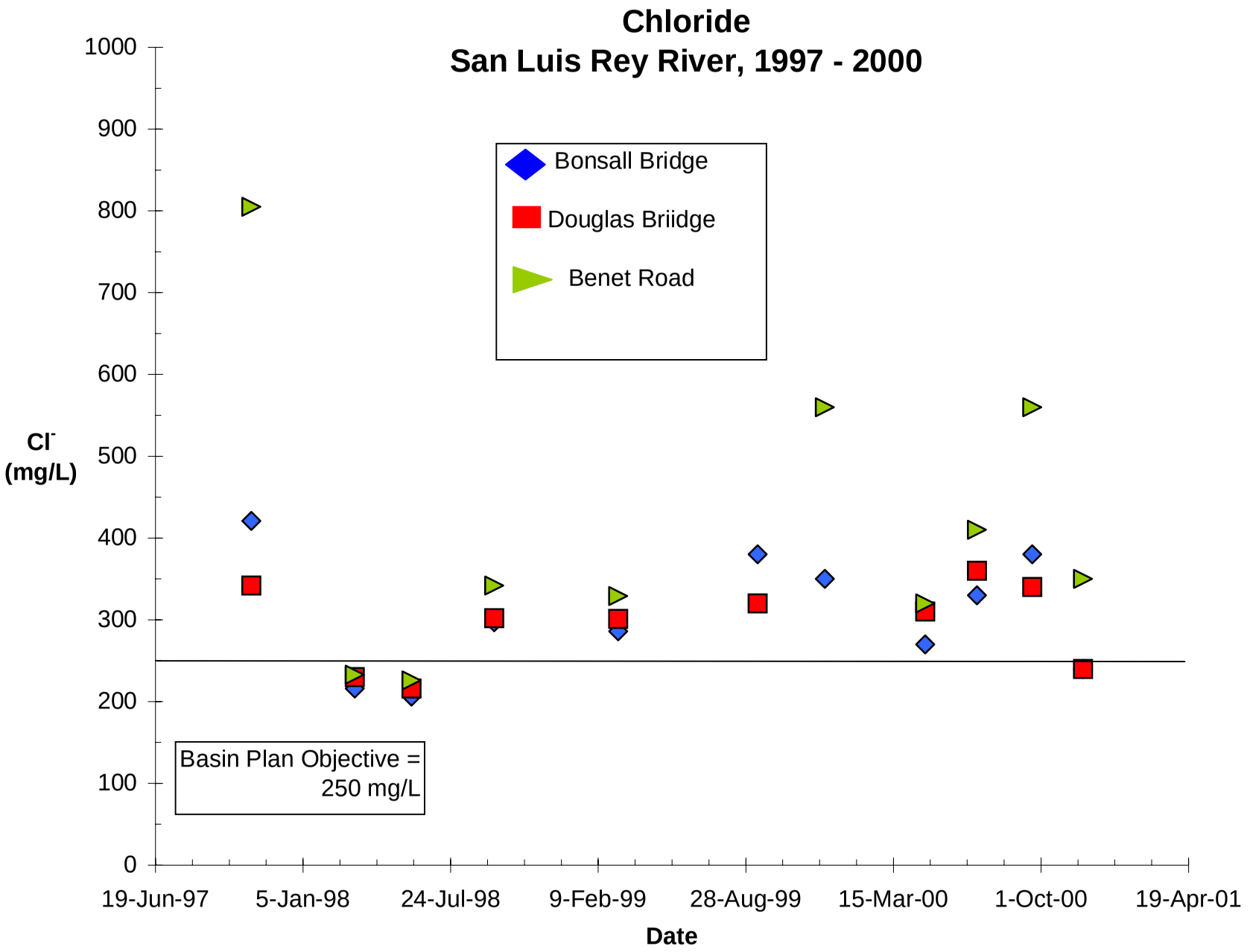
Sampling by the Regional Water Quality Control Board, San Diego Region in May and June of 1998[3] also contain evidence of elevated concentrations of TDS. One sample at Foussat Rd had a concentration of 850 mg/L and one sample at Old Highway 395 had a concentration of 970 mg/L.

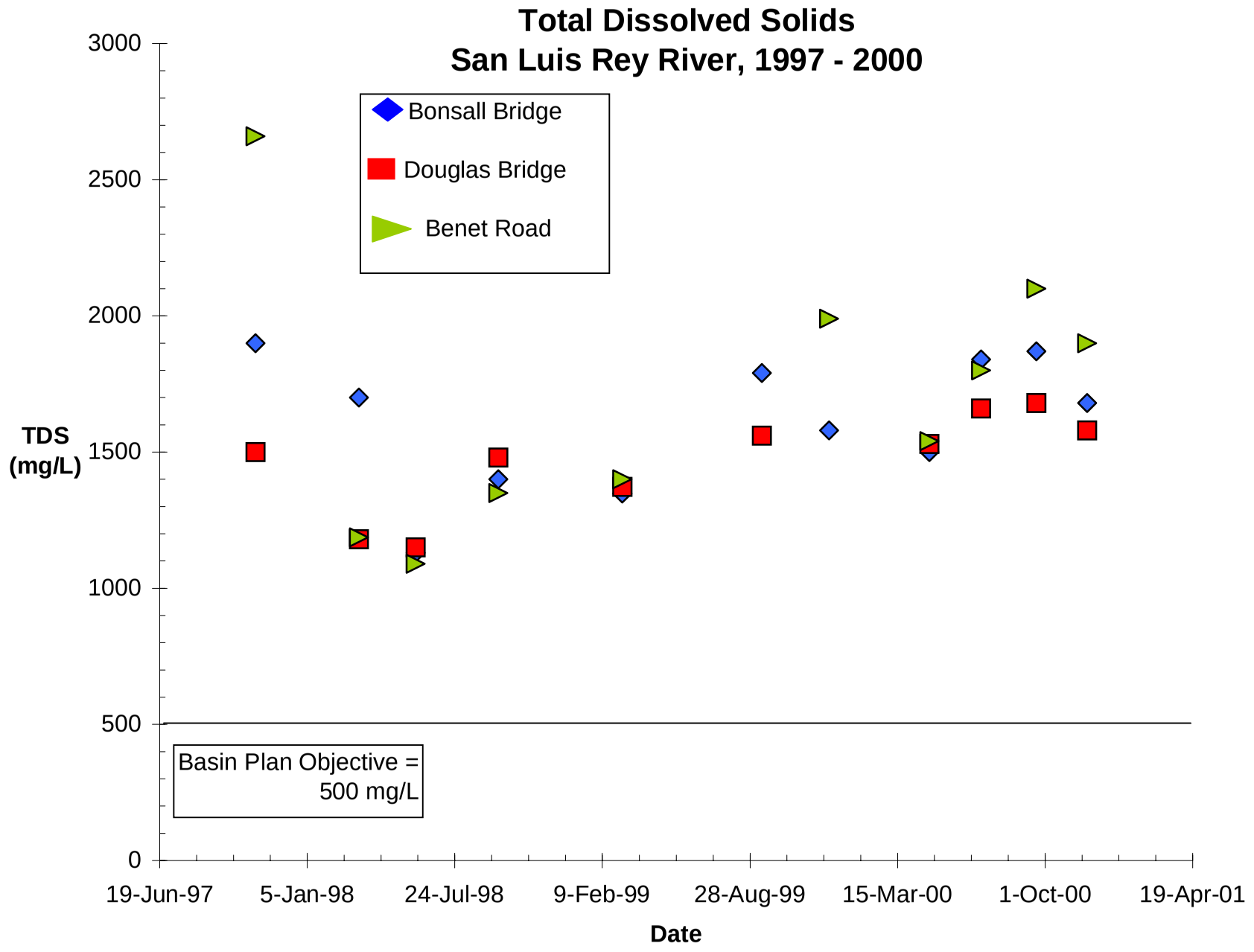
Total Dissolved Solids may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High concentrations of TDS are expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1].

EXTENT OF IMPAIRMENT

Chloride Sampling occurred at 3 locations on the San Luis Rey River: at Bonsall Bridge, at Douglas Bridge and at Benet Road. All 3 locations are in or near the City of Oceanside, in the lower section of the river. From Bonsall Bridge, the furthest upstream location, to the mouth is listed as impaired. This is approximately the lower 13 miles.

TDS Sampling occurred at 3 locations on the San Luis Rey River: at Bonsall Bridge, at Douglas Bridge and at Benet Road. All 3 locations are in or near the City of Oceanside, in the lower section of the river. Sampling also occurred at Foussat Rd and at Old Highway 395, the furthest upstream location. From Old Highway 395 to the mouth is listed as impaired. This is approximately the lower 17 miles.


Chloride
San Luis Rey River, 1997 - 2000
Bonsall Bridge
Douglas Briidge
Benet Road
Basin Plan Objective =
250 mg/L
Cl- (mg/L)
1000
900
800
700
600
500
400
300
200
100
0
19-Jun-97
5-Jan-98
24-Jul-98
9-Feb-99
28-Aug-99
15-Mar-00
1-Oct-00
19-Apr-01
Date


Total Dissolved Solids
San Luis Rey River, 1997 - 2000
Bonsall Bridge
Douglas Bridge
Benet Road
Basin Plan Objective =
500 mg/L
TDS
(mg/L)
3000
2500
2000
1500
1000
500
0
19-Jun-97
5-Jan-98
24-Jul-98
9-Feb-99
28-Aug-99
15-Mar-00
1-Oct-00
19-Apr-01
Date

POTENTIAL SOURCES

Chloride Urban runoff, other point sources, non-point sources and natural sources.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Chloride Low

TDS Low

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Quarterly Monitoring Reports for the City of Oceanside. 1997- 2000. City of Oceanside, CA.

[3] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region.

AGUA HEDIONDA CREEK
Hydrologic Subarea 904.31

NEW 303(d) LISTINGS

Diazinon and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

Agua Hedionda Creek is a coastal stream located in the Agua Hedionda watershed, in Northern San Diego County. It is 10.40 miles long. It is designated for the following beneficial uses: MUN, AGR, IND, REC1, REC2, WARM and WILD.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED

Diazinon Water Quality Criteria compiled by the California Department of Fish and Game[2] for diazinon are described below.

Pesticide	**Water Quality Criteria (µg/L)**			**Detection Limit** (µg/L)
	CA Fish and Game	US EPA	CA Fish and Game	
Diazinon	0.05[A]	0.09[B]	0.08 [C]	0.05

[A]Criterion Continuous Concentration, [B]Draft Criterion Maximum Concentration (CMC), [C]Criterion Maximum Concentration (CMC)

TDS The Basin Plan objective for TDS is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT

Diazinon Sampling by the City of San Diego[2] at station AH-1 from November 1998 to March 2000 showed 4 out of 6 (67%) samples to exceed all of the diazinon water quality criteria. The average concentration was 0.217 µg/L and the median concentration was 0.225 µg/L. All non-detects were treated as 0.0 mg/L for statistical purposes. All sampling occurred in the months of November, January, March and February (i.e. the rainy season).

It is expected that the WARM and WILD beneficial use would be impaired if diazinon is creating an unhealthy environment for aquatic organisms.

TDS City of San Diego[2] sampling from November 1998 to March 2000 showed exceedance of the Basin Plan objective for more than 10% of the time during a one-year period. At station AH1 from June 1998 to March 1999, 4 of 4 samples (100%) exceeded the objective, with a mean of 1268.0 mg/L and a median of 1251.5 mg/L. From January 2000 to March 2000, 1 of 3 samples (33%) exceeded the objective, with a mean of 684.3 mg/L and a median of 362.0 mg/L. One other station also demonstrated a TDS concentration to exceed the objective in June of 1998. The concentration at AHC-SA was 1372 mg/L. All non-detects were treated as 0.0 mg/L for statistical purposes.

Regional Board[3] TDS sampling in June of 1998 also show Agua Hedionda Creek to have concentrations above the Basin Plan objective. The concentration at Sycamore

Avenue was 1372 mg/L, at El Camino Real the concentration was 1716 mg/L and 1624 mg/L.

TDS may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High TDS concentrations may be expected to impair the MUN beneficial use[1]. High concentrations of TDS are also expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1].

EXTENT OF IMPAIRMENT

Diazinon Station AH-1 is located immediately downstream of the confluence of Agua Hedionda Creek and Calavera Creek, 1.3 miles upstream of Aqua Hedionda Lagoon. Since sampling occurred only at this 1 station, the extent of impairment is approximately ½ mile upstream of AH-1 down to the lagoon. This covers approximately the lower 2 miles of the creek.

TDS TDS sampling occurred at station AH-1 and at one other location along the creek. The most upstream location was at Sycamore Avenue (AHC-SA), approximately 7.5 miles upstream of the lagoon. Therefore, the lower 8 miles of the stream is listed as impaired due to elevated concentrations of TDS.

POTENTIAL SOURCES

Diazinon Urban runoff and agricultural runoff.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Diazinon Medium (Currently, there is ongoing development of a TMDL addressing the elevated levels of diazinon in Chollas Creek.[4])

TDS Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego, 2000. 1999-2000 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report, URS Greiner Woodward Clyde.

[3] SDRWQCB In-House Monitoring. 1998. California Regional Water Quality Control Board, San Diego Region.

[4] SDRWQCB, 2001. Draft Staff Report for Diazinon Total Maximum Daily Load for Chollas Creek. December, 2001

GREEN VALLEY CREEK
Hydrologic Subarea 905.21

NEW 303(d) LISTINGS
Sulfate

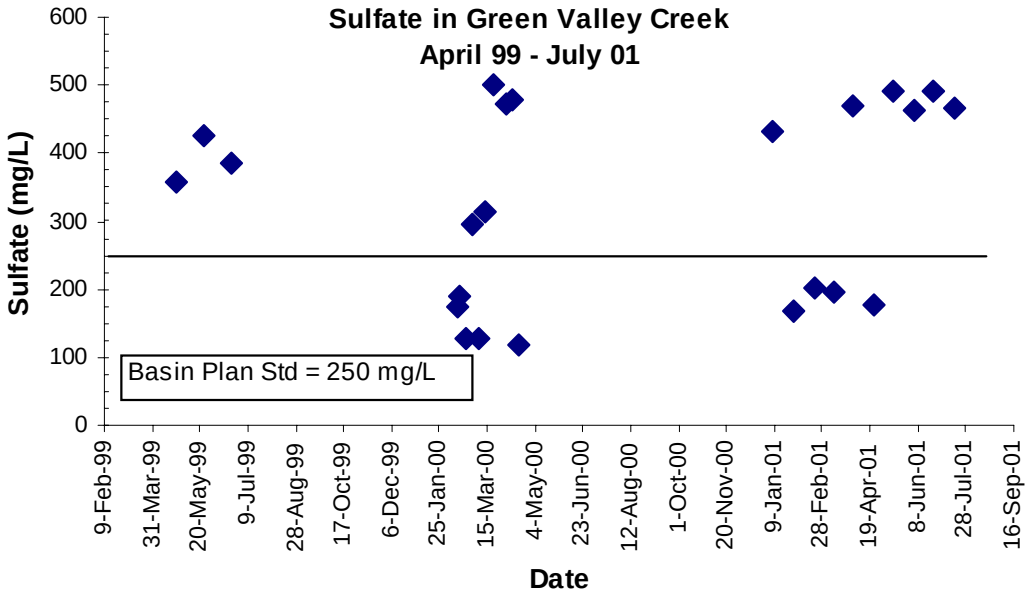
PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The lagoon forms the northerly boundary of the City of Del Mar. The lagoon is normally closed off from the ocean by a sandbar. Green Valley Creek eventually flows into Lake Hodges. Beneficial uses include: MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD and RARE[1].

WATER QUALITY OBJECTIVES NOT ATTAINED
Sulfate The Basin Plan[1] objective for sulfate in surface waters of hydrologic unit # 905 is 250 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Sulfate Data from the City of San Diego Water Quality Lab[2] from April 1999 to July 2001 show the Basin Plan objective to be exceeded for more than 10% of the time during a one-year period. From April 1999 to April 2000, 8 of 13 samples (62%) exceeded the objective, with a mean of 305.1 mg/L and a median of 313.0 mg/L. From January 2001 to July 2001, 6 of 10 samples (60%) exceeded the objective, with a mean of 355.7 mg/L and a median of 447.0 mg/L. It should be noted that the majority of the sampling occurred during the months of January, February, March and April. This is generally considered to be the rainy season in San Diego.

The data indicate sulfate concentrations to be increasing over this time period, but the data represent only a short temporal span (see figure below). The Basin Plan recommended secondary drinking water standard for sulfate is 250 mg/L, with an upper limit of 500 mg/L. While no concentrations exceeded this upper limit, the increase in concentrations over the time period reviewed, indicate that this may soon happen. High concentrations of sulfate in drinking water can cause laxative effects[1] and would impair the MUN beneficial use.



EXTENT OF IMPAIRMENT

Sulfate The single monitoring station is described as "west of West Bernardo Dr."[2] The extent of impairment is ½ mile up and downstream of this location.

POTENTIAL SOURCES

Sulfate Urban runoff, other point sources, non-point sources and natural sources.

TMDL PRIORITY

Sulfate Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Green Valley Creek

LAKE HODGES
Hydrologic Subarea 905.21

NEW 303(d) LISTINGS
Color, Nitrogen, Phosphorus and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The San Dieguito River, Felicita Creek, Green Valley Creek, Kit Carson Creek and Santa Ysabel Creek are all tributaries to Lake Hodges. All waters that flow into Lake Hodges are local surface water runoff. Beneficial uses of Lake Hodges include: MUN, AGR, IND, PROC, REC1 (fishing from shore or boat only), REC2, WARM, COLD, WILD and RARE[1].

WATER QUALITY OBJECTIVE NOT ATTAINED
Color The Basin Plan[1] objective for color is 15 color units. This objective is not to be exceeded more than 10% of the time during any one-year period.

Nitrogen, Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." Additionally, threshold phosphorus levels shall not exceed 0.025 mg/L in any standing body of water.[1] Analogous threshold values for nitrogen compounds have not been set, however; it is stated that a ratio of N:P=10:1 shall be used. In the case of a standing body of water, the threshold nitrogen level is therefore set at 0.25 mg/L. These objectives are not to be exceeded more than 10% of the time during any one-year period.

TDS The Basin Plan[1] objective for TDS in waters designated for use as municipal supply is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Color Data from the City of San Diego Water Quality Lab[2] from September 1997 to December 2000 show the Basin Plan objective to be exceeded for more than 10% of the time during a one-year period. From March 1998 to March 1999, 4 of 4 samples (100%) exceeded the objective, with a mean of 53.6 color units and a median of 37.3 color units. From June 1999 to June 2000, 5 of 5 samples (100%) exceeded the objective, with a mean of 65.8 color units and a median of 78.0 color units. In September and December of 2000, 2 of 2 samples (100%) exceeded the objective, with a mean and median of 64.0 color units.

Elevated color levels are expected to impair the MUN and REC2 beneficial uses. In addition, color can be indicative of other water quality problems, such as eutrophication. This may be the case, as described in the next section below. In this event, additional beneficial uses may be expected to be impaired.

Nitrogen Data from the City of San Diego Water Quality Lab[2] from July 1997-May 2001 show that 5 locations exceeded the Basin Plan[1] objective for more than 10% of the time during a one-year period. See the table below for the average, median and frequency of exceedances for total nitrogen (sum of ammonia, total Kjeldahl nitrogen, nitrate, nitrite, all of which were numerically adjusted to represent nitrogen) at the 5 stations.

Phosphorus Data from the City of San Diego Water Quality Lab[2] from July 1997-May 2001 show that 5 locations exceeded the Basin Plan[1] objective for more than 10% of the time during a one-year period. See the table below for the average, median and frequency of exceedances for phosphate (which was adjusted to represent phosphorus) at the 5 stations.

The first sampling location is near the boat launch ramp. The rest of the sampling points are located at various depths at Station A, which is in front of the reservoir dam and outfall structure to the flume delivering water to Badger Filtration Plant.

	Total Nitrogen (Nitrogen objective = 0.25 mg/L)			**Total Phosphorus** (Phosphorus objective = 0.025 mg/L)		
Date	**Avg (mg/L)**	**median (mg/L**	**exceedance**	**Avg (mg/L)**	**median (mg/L**	**exceedance**
HG Rec Area Delivery Point						
Mar 97 to Mar 98	2.830	3.413	4 of 5, 80%	0.085	0.103	3 of 4, 75%
Jun 98 to Jun 99	3.077	3.816	4 of 5, 80%	0.113	0.093	4 of 4, 100%
Sep 99 to Sep 00	3.812	3.842	5 of 5, 100%	0.089	0.085	5 of 5, 100%
Dec 00 to July 01	3.503	4.148	4 of 5, 80%	0.093	0.091	4 of 4, 100%
HG STATION A 12 m.						
Jan 97 to Jan 98	1.052	0.491	6 of 11, 55%	0.301	0.156	7 of 8, 88%
Feb 98 to Mar 99	1.166	0.901	10 of 13, 77%	0.436	0.460	9 of 9, 100%
HG STATION A 3 m.						
Jan 97 to Jan 98	0.221	0.033	2 of 11, 18%	0.020	0.000	1 of 8, 13%
Feb 98 to Mar 99	0.249	0.120	7 of 13, 54%	0.046	0.000	3 of 9, 33%
HG STATION A Btm -1 ft.						
Jan 97 to Jan 98	1.225	0.743	7 of 11, 64%	0.339	0.228	8 of 8, 100%
Feb 98 to Mar 99	1.935	1.245	12 of 13, 92%	0.501	0.505	9 of 9, 100%
HG STATION A Surface						
Jan 97 to Jan 98	0.594	0.013	5 of 13, 39%	0.016	0.000	1 of 9, 11%
Feb 98 to Feb 99	0.792	0.314	6 of 12, 50%	0.072	0.000	4 of 9, 44%
Mar 99 to Mar 00	1.763	1.835	5 of 5, 100%	0.035	0.000	1 of 5, 20%
Jun 00 to Jul 01	1.843	1.712	6 of 6, 100%	0.020	0.000	1 of 6, 17%

Elevated nutrient (nitrate and phosphorus) concentrations that contribute to excessive algae growth can lead to eutrophic conditions and result in decreased water clarity, offensive odors, and a decrease in dissolved oxygen (DO) that is detrimental to aquatic life. The depletion of DO concentrations and the production of un-ionized ammonia

caused by the decomposition of plant matter associated with eutrophic conditions can cause fish kills and other adverse effects on aquatic life; thus impacting habitat-related beneficial uses such as WARM, COLD, WILD and RARE. Decreased water clarity and odors potentially impact the municipal and domestic uses such as MUN, IND, PROC, and AGR. Additionally, contact and non-contact recreation beneficial (REC1, REC2) uses may be impacted by offensive odors associated with excessive algae growth, constituting a nuisance.

In addition to the data analysis described above, it is evident in correspondence between City of San Diego staff and the Regional Board[3] that eutrophic conditions are already a problem at the reservoir. San Diego staff have noted excessive algae growth and odor problems, which is most likely caused by the presence of excessive amounts of nitrogen and phosphorus.

TDS Data from the City of San Diego Water Quality Lab[2] from September 1998 to December 2000 show the Basin Plan objective to be exceeded for more than 10% of time during a one-year period. From September 98 to September 99, 5 of 5 samples (100%) exceeded the objective, with a mean of 653.6 mg/L and a median of 659.0 mg/L. From December 99 to December 00, 5 of 5 samples (100%) exceeded the objective, with a mean of 770.2 mg/L and a median of 754.0 mg/L.

Total Dissolved Solids may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High concentrations of TDS are expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1]. The average TDS concentration was in the middle of this range.

EXTENT OF IMPAIRMENT

(The 2 sampling stations are considered indicative of a standing, homogenous waterbody.)

Color	Entire reservoir
Nitrogen, Phosphorus	Entire reservoir
TDS	Entire reservoir

POTENTIAL SOURCES

Color Urban runoff, other point sources and non-point sources.

Nitrogen, Phosphorus Possible sources include urban runoff, local dairies, agriculture, orchards, other point sources and non-point sources.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Color Low

Nitrogen, Phosphorus Low (Currently, there is ongoing development of a TMDL addressing the elevated levels of nitrogen and phosphorus in Rainbow Creek.[4])

TDS Low

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Hodges Reservoir

[3] City of San Diego. Staff observations in memo dated 8/16/01.

[4] SDRWQCB, 2001. Draft Staff Report for Nutrient Total Maximum Daily Load for Rainbow Creek. October 19, 2001

FELICITA CREEK
Hydrologic Subarea 905.23

NEW 303(d) LISTINGS
Total Dissolved Solids (TDS)

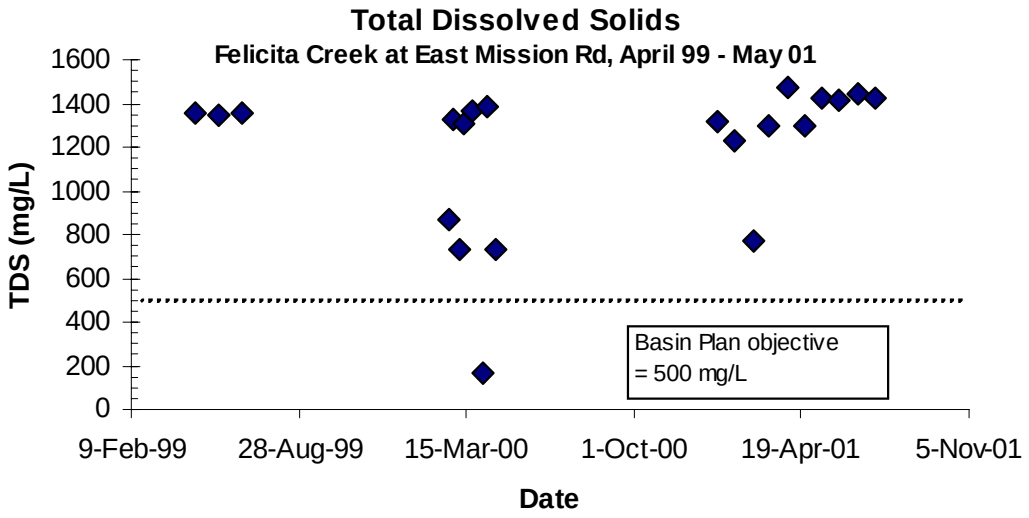
PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Felicita Creek is located in the San Dieguito River Watershed. San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The lagoon forms the northern boundary of the City of Del Mar. The lagoon is normally closed off from the ocean by a sandbar. Felicita Creek eventually flows into Lake Hodges. Beneficial uses of Felicita Creek include: MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD and WILD[1].

WATER QUALITY OBJECTIVES NOT ATTAINED
TDS The Basin Plan objective for TDS is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
TDS Sampling by the City of San Diego[2] between April 1999 and May 2001 showed the Basin Plan objective to be exceeded for more than 10% of the time during a one year period. Near Quiet Hills Farm Road, from April to June 999, 3 of 3 samples (100%) exceeded the objective, with a mean of 1343.3 mg/L and a median of 1340.0 mg/L. Near East Mission Road, from April 1999 to April 2000, 10 of 11 samples (91%) exceeded the objective, with a mean of 1088.3 mg/L and a median of 1330.0 mg/L. From January 2001 to July 2001, 10 of 10 samples (100%) exceeded the objective, with a mean of 1308.1 mg/L and a median of 1365.0 mg/L. The data indicate TDS concentrations to be increasing over this time period, but the data represent only a short temporal span (see figure below).

TDS may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High TDS concentrations may be expected to impair the MUN beneficial use[1]. High concentrations of TDS are also expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops.[1]



EXTENT OF IMPAIRMENT

TDS Two stations were sampled. One location is described as at the road crossing and above the waterline. The road is East Mission Road; accessible off Interstate 15. The second location is off Quiet Hills Farm Rd. Since both locations showed elevated concentrations of TDS, the extent of impairment is ½ mile upstream of Quiet Hill Farm Rd to ½ mile downstream of East Mission Rd. This covers approximately the lower 2 miles of the creek.

POTENTIAL SOURCES

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

TDS Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Felicita Creek

KIT CARSON CREEK
Hydrologic Subarea 905.23

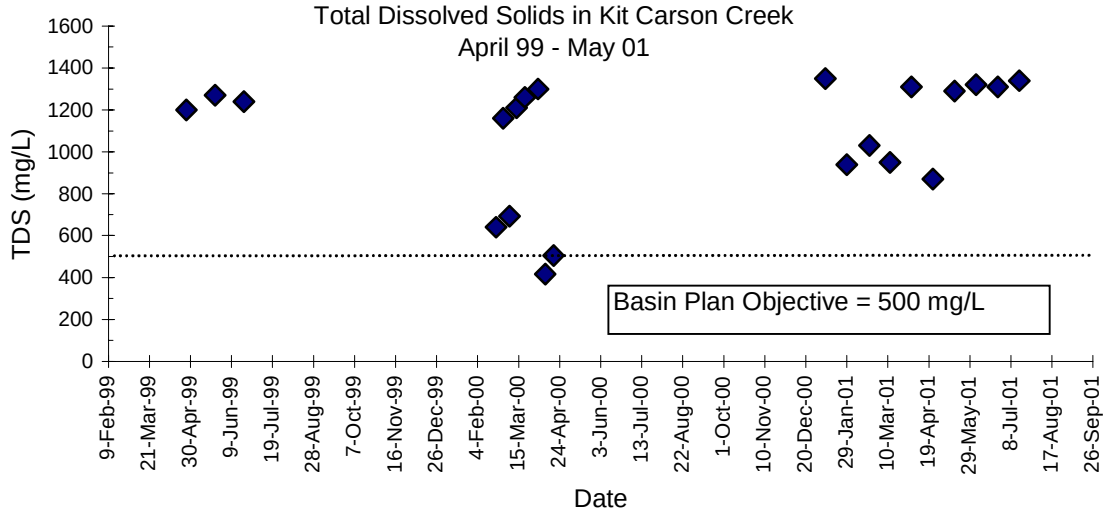
NEW 303(d) LISTINGS
Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Kit Carson Creek in located in the San Dieguito Watershed, in the urbanized area of the inland City of Escondido. The San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The lagoon forms the northern boundary of the City of Del Mar. The lagoon is normally closed off from the ocean by a sandbar. Kit Carson Creek eventually feeds into Lake Hodges. Beneficial uses include: MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD and WILD[1].

WATER QUALITY OBJECTIVE NOT ATTAINED
TDS The Basin Plan[1] objective is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
TDS Data from the City of San Diego Water Quality Lab[2] from April 1999 to May 2001 show the Basin Plan objective to be exceeded for more than 10% of the time during a one-year period. From April 1999 to April 2000, 10 of 11 samples (91%) exceeded the objective, with a mean of 990.5 mg/L and a median of 1200.0 mg/L. From January 2001 to July 2001, 10 of 10 samples (100%) exceeded the objective, with a mean of 1170.9 mg/L and a median of 1300.0 mg/L. It should be noted that the majority of the sampling occurred during the months of January, February, March and April. This is generally considered to be the rainy season in San Diego. See graph below for concentrations plotted against time of year.



Total Dissolved Solids may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High concentrations of TDS are expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1]. The average TDS concentration was in the middle of this range.

EXTENT OF IMPAIRMENT

TDS The station is described as "Kit Carson at Sunset Dr."[2] The extent of impairment is estimated as ½ mi. up and downstream of this location.

POTENTIAL SOURCES

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature[3]. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

TDS Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Kit Carson Creek

[3] California Regional Water Quality Control Board, San Diego Region. Staff observations. 2001.

CLOVERDALE CREEK
Hydrologic Subarea 905.31

NEW 303(d) LISTINGS
Phosphorus and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Cloverdale Creek is located in San Pasqual Valley in the San Dieguito River Watershed. The San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The lagoon forms the northern boundary of the City of Del Mar. The lagoon is normally closed off from the ocean by a sandbar. Beneficial uses for Cloverdale Creek include: MUN, AGR, IND, PROC, REC1 (designated potential), REC2, WILD and WARM.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED
Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus is 0.1 mg/L for flowing surface waters. This objective is not to be exceeded more than 10% of the time during any one-year period.

TDS The Basin Plan[1] objective for TDS is 500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

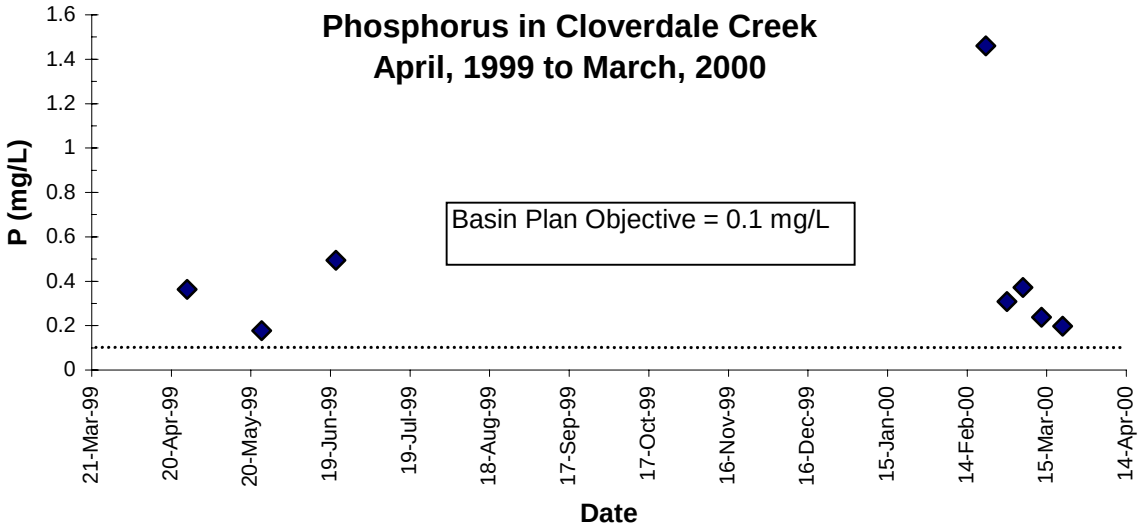
EVIDENCE OF IMPAIRMENT
Phosphorus Sampling by the City of San Diego[2] at station CDC4 between April 1999 and March 2000 showed the Basin Plan objective for phosphorus to be exceeded for more than 10% of the time during the year. Eight of 8 samples exceeded the objective, with an average concentration was 0.45 mg/L and a median concentration was 0.34 mg/L. See chart below.

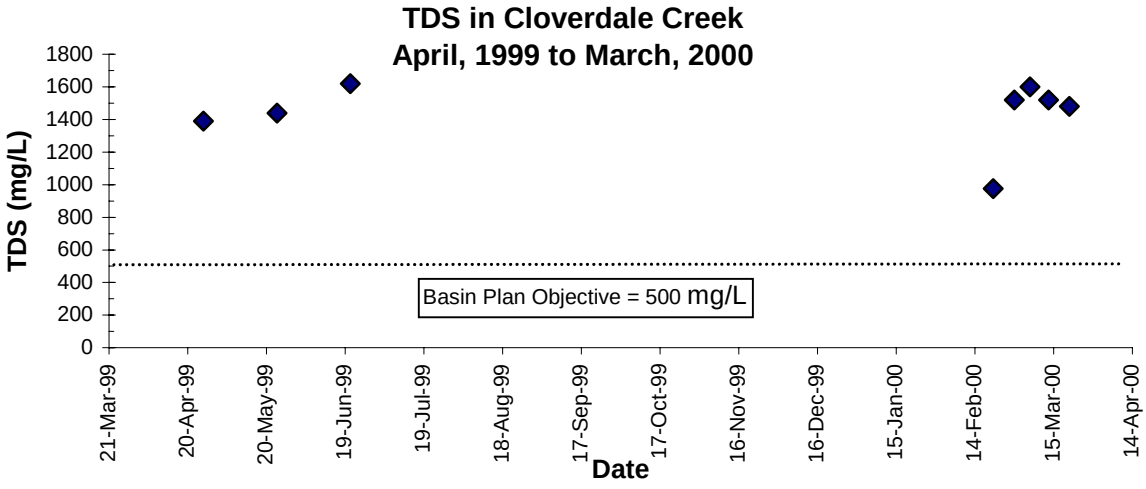
These concentrations of phosphorus over the Basin Plan objective are expected to contribute to excess algae growth that may impair the MUN, REC1, REC2, WARM, COLD, WILD and RARE beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

TDS Sampling by the City of San Diego[2] at station CDC4 between April 1999 and March 2000 showed the Basin Plan objective for TDS to be exceeded for more than 10% of the time during the year. Eight of 8 samples exceeded the objective, with an average concentration of 1443.4 mg/L and a median concentration of 1500.0 mg/L. See chart below.

TDS may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human

impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High TDS concentrations may be expected to impair the MUN beneficial use[1]. High concentrations of TDS are also expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1].





EXTENT OF IMPAIRMENT

Phosphorus The location of station CDC4 is in San Pasqual Valley. Since only one station was sampled, the extent of impairment is ½ mile up and downstream from this location.

TDS The location of station CDC4 is in San Pasqual Valley. Since only one station was sampled, the extent of impairment is ½ mile up and downstream from this location.

POTENTIAL SOURCES

Phosphorus Urban runoff, agriculture runoff, other point sources and non-point sources.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, agriculture runoff, other point sources and non-point sources.

TMDL PRIORITY

Phosphorus Low

TDS Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Cloverdale Creek

SUTHERLAND RESERVOIR
Hydrologic Subarea 905.53

NEW 303(d) LISTINGS
Color

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Sutherland Reservoir is located in the San Dieguito River Watershed. The reservoir encompasses an area of 557 acres. San Dieguito Hydrologic Unit (HU 905.00) is a rectangular-shaped area of about 350 square miles. It includes the San Dieguito River and its tributaries, including Santa Ysabel and Santa Maria Creeks. The HU contains two major reservoirs, Lake Hodges and Sutherland Reservoir. The San Dieguito Lagoon is located at the mouth of the San Dieguito River. The lagoon forms the northerly boundary of the City of Del Mar. The lagoon is normally closed off from the ocean by a sandbar. Sutherland Reservoir is fed exclusively from local surface water runoff. Beneficial uses of Sutherland Reservoir include: MUN, AGR, IND, PROC, REC1 (fishing from boat and shore only), REC2, WARM, RARE, COLD and WILD[1].

WATER QUALITY OBJECTIVE NOT ATTAINED
Color The Basin Plan[1] objective is 15 color units. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Color Data from the City of San Diego Water Quality Lab[2] from March 1997 to June 2000 show the Basin Plan objective to be exceeded for more than 10% of the time during a one-year period. From March 1998 to March 1999, 3 of 3 samples (100%) exceeded the objective, with a mean of 33.7 color units and a median of 34.0 color units. From June 1999 to June 2000, 5 of 5 samples exceeded the objective, with a mean of 25.2 color units and a median of 26.0 color units. Form September 2000 to December 2000, 3 of 3 samples exceeded the objective, with a mean of 22.3 color units and a median of 28.0 color units.

In addition, staff at the San Diego Water Department have noticed a persistent odor problem as well as excessive algae growth at the reservoir.[3] Odor, color, and excessive algae growth in the reservoir are typically due to excessive nutrients (nitrogen and phosphorous). However, actual concentrations of nitrogen and phosphorous do not currently exceed Basin Plan objectives. This may be due to the fact that the algae are using a majority of the available nutrients. Nutrient data from City of San Diego Water Quality Lab[2] from March 1997 to July 2001 showed only 1 of 17 samples (6%) to have a detectable concentration of phosphate or nitrate.

Elevated color levels are expected to impair the MUN and REC2 beneficial uses. If color is indicative of other problems (i.e. eutrophication) other beneficial uses would be expected to be impaired.

EXTENT OF IMPAIRMENT
Color As the City of San Diego selects sampling locations to be indicative of the entire reservoir, the same reasoning will apply here. Therefore, the entire reservoir (557 acres) is listed as impaired for color.

POTENTIAL SOURCES

Color Elevated color levels may be coming from excessive algae growth. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Color Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Quality Lab, 2001. Electronic data submitted to California Regional Water Quality Control Board, San Diego Region, S:\wqs\303d\City of San Diego\Sutherland Reservoir

[3] California Regional Water Quality Control Board, San Diego Region. Staff observations. 2001.

FORRESTER CREEK
Hydrologic Subarea 907.12

NEW 303(d) LISTINGS
Fecal Coliform, pH and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
Forrester Creek is a 6.0-mile waterway in the San Diego River Watershed of Region 9. It originates in the City of El Cajon, flows through the City of Santee and drains into the San Diego River. Much of the upper portion is a concrete lined channel. It is classified as inland surface water with the following beneficial uses: MUN (designated potential), IND, REC1, REC2, WARM, COLD and WILD[1].

WATER QUALITY OBJECTIVES NOT ATTAINED
Fecal Coliform Although both steady state (30-day period) and single sample objectives are available, only the particular objective used for data assessment is described below.

For single samples, the Basin Plan[1] objective states that no more than 10% of the total samples during any 30-day period shall exceed 400 colonies/100 mL.

pH The Basin Plan[1] objective for pH in inland surface waters is 6.5 – 8.5.[1]

TDS The Basin Plan[1] objective for surface waters in the lower portion of hydrologic unit sub area 907.12 is 1500 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT
Fecal Coliform Sampling was done by the Padre Dam Municipal Wastewater District[2] intermittently from October 1997 to September 2000. Data was taken once a month for October-March and twice a month for April-October. The data shows that 14 of 38 samples (37%) in both wet and dry weather had levels of fecal coliform in excess of 400 Most Probable Number (MPN)/mL.

The Basin Plan[1] objective for fecal coliform has a temporal component stating that not more than 10% of the total samples during any 30-day period shall exceed the numeric criteria. The data provided by Padre Dam Municipal Wastewater District[2] does not contain more than 2 samples in any 30-day span, which makes it difficult to ascertain the severity of the exceedances. However, 13 of 24 months exceeded the fecal coliform objective in more than 10% of the samples. While the sample size per month is limited, the larger data set representing the longer temporal period shows the exceedance of the objective to be chronic. Therefore, it is concluded that this data set serves as evidence of impairment of the fecal coliform objective.

These concentrations of fecal coliform over the Basin Plan[1] objectives can contribute to human illness through contact with contaminated waters, and are expected to impair the REC1 beneficial use.

pH Data collected by the City of El Cajon[3] from September 1994 to January 2001 show that 28 of 34 pH samples (82%) exceeded the Basin Plan objective. The average pH value was 9.0 and the median value was 8.9.

In addition, spill reports from the City of El Cajon[4] record a spill of approximately 1000 gallons of sodium hydroxide into Forrester Creek in July 2000. Measurements of pH were high before and after this reported spill. Existing regulatory actions may not be sufficient to protect Forrester Creek from high pH.

A change of one point on the pH scale represents a ten-fold increase in acidity or alkalinity. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration. Elevated pH can increase the toxicity of ammonia and this would impair the WARM, COLD and WILD beneficial uses of the creek.

TDS The Basin Plan objective[1] for TDS of 1500 mg/L was exceeded for more than 10%of the time during a one-year period as measured by the Padre Dam Municipal Wastewater District.[2] From September 1997 to September 1998, 17 of 18 samples (94%) exceeded the objective, with a mean of 1667.3 mg/L and a median of 1738.0 mg/L (15.9% above the objective). From October 1998 to October 1999, 16 of 20 samples (80%) exceeded the objective, with a mean of 1647.6 mg/L and a median of 1706.0 mg/L (13.7% above the objective). From November 1999 to December 2000, 19 of 21 samples (95%) exceeded the objective, with a mean of 1589.7 mg/L and a median of 1656.0 mg/L (10.4% above the objective).

TDS may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.) Most of the problem can be traced to human impacts, and therefore, can be mitigated. Geologic conditions help to define the natural levels of many of these constituents. High TDS concentrations may be expected to impair the MUN beneficial use due to taste considerations.[1]

EXTENT OF IMPAIRMENT

Fecal Coliform Samples in Forrester Creek were taken at only one monitoring point, just upstream of the confluence with the San Diego River. The extent of impairment is the lower 1 mile of the creek.

pH The City of El Cajon[3] sampled six drainage areas along Forrester Creek, all in commercial and industrial zones in the City of El Cajon. The sampling areas are north of I-8 between Magnolia and Johnson, four hundred feet before the junction with Washington Channel, to the East of city shops at Vernon, north of Vernon Way between Johnson and Marshall, at the intersection of Marshall and B. Mitchell, and at the north city limit of Forrester Creek. Most of these stations are now concrete-lined channels. All of these stations display high pH. Therefore, the extent of impairment is the extent of the reach within the City of El Cajon. This upper portion of the creek is approximately 3.0 miles.

TDS Sampling by Padre Dam Municipal Wastewater District[2] occurred only at one location on Forrester Creek. This location is near the confluence with the San Diego River. Therefore, the extent of impairment is the lower 1 mile of the creek (1/2 mile up and downstream of the sampling point).

POTENTIAL SOURCES

Fecal Coliform Urban runoff, other point sources, non-point sources and sewage spills.

pH Sources may include industrial spills, urban runoff, other point sources and non-point sources. The very nature of concrete lined conveyance structures can also cause high pH levels. These structures often have very little shade cover. Increased light penetration will increase solar heating of the water and can favor photosynthesis. Both of these conditions will increase pH. Also, the chemical composition of the concrete itself may leach compounds into the water that will elevate pH directly.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Fecal Coliform	Medium
pH	Low
TDS	Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Padre Dam Municipal Wastewater District, 2000. Receiving Water Sampling and Analysis. Electronic data submission to California Water Quality Control Board, San Diego Region.

[3] City of El Cajon, 1994-2000. NPDES Field Screening Data. Regional Water Quality Control Board, San Diego Region: Order No. 90-42.

[4] City of El Cajon, 2000. Letter to Chem-tronics re: Spill Report (dated July 2, 2000). City of El Cajon, Engineering.

SAN DIEGO RIVER, Lower
Hydrologic Subareas 907.11, 907.12

NEW 303(d) LISTINGS

Dissolved Oxygen, Fecal Coliform, Phosphorus and Total Dissolved Solids (TDS)

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

The Lower San Diego River is a 20-mile urban waterway in the San Diego River Watershed of Region 9. The San Diego River originates in the East County, passing through Lakeside and Santee, and then runs parallel to Interstate 8 all the way to the Pacific Ocean coastline where it discharges near Ocean Beach. The lower portion of the river begins just north of Lake Jennings, near the town of Lakeside. It is classified inland surface water with the following beneficial uses: MUN (designated potential), AGR, IND, REC1, REC2, WARM, COLD WILD and RARE[1].

WATER QUALITY OBJECTIVES NOT ATTAINED

Dissolved Oxygen The Basin Plan[1] dissolved oxygen objective for inland surface waters designated with a COLD beneficial use is 6.0 mg/L. The entire San Diego River is designated for COLD beneficial use. The Basin Plan[1] also states that the annual mean concentration shall not be less than 7 mg/L more than 10% of the time.

Fecal Coliform Although both steady state (30-day period) and single sample objectives are available, only the particular objective used for data assessment is described.

For single samples, the Basin Plan[1] objective states that no more than 10% of the total samples during any 30-day period shall exceed 400 colonies/100 mL.

Phosphorus The Basin Plan[1] states that "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan[1] biostimulatory substance objective for phosphorus is 0.1 mg/L. This objective is not to be exceeded more than 10% of the time during any one-year period.

TDS The Basin Plan[1] TDS objective is 1500 mg/L for areas in both hydrologic sub areas. This objective is not to be exceeded more than 10% of the time during any one-year period.

EVIDENCE OF IMPAIRMENT

Dissolved Oxygen Sampling in September 1997 and from April to December 2000 by the Padre Dam Municipal Wastewater District[2] showed dissolved oxygen concentrations to be below the Basin Plan Objective of 6.0 mg/L in 76 of 84 samples (90%). Concentrations below the objective were measured at all 5 sampling points along the river. The average measured concentration was 4.87 mg/L and the median concentration was 4.48 mg/L. In addition, during the year 2000, all 5 stations were below the annual Basin Plan Objective of 7.0 mg/L for more than 10% of the time. See the table below for frequency of samples below this annual water quality objective. It should be noted that sampling occurred approximately mid-morning which corresponds to the lower range of daily dissolved oxygen concentrations.

Date	Carlton Hills Blvd Bridge	Mast Blvd Bridge	Old Mission Dam	Mission Pond	Fashion Valley Rd
3-Jan-00	7.18	6.36	8.05	8.00	8.13
7-Feb-00	5.46	6.00	7.16	6.09	4.55
6-Mar-00	5.60	6.35	6.80	7.22	5.80
3-Apr-00	3.67	4.79	6.40	5.55	6.87
17-Apr-00	3.60	4.76	5.41	4.37	7.08
1-May-00	3.09	4.31	4.77	3.42	4.88
15-May-00	4.00	5.48	5.60	3.68	4.10
30-May-00	5.10	3.60	5.30	2.90	4.30
12-Jun-00	3.78	4.10	4.90	2.29	3.25
26-Jun-00	3.38	3.84	4.36	1.94	2.02
10-Jul-00	3.70	4.40	6.05	2.42	3.60
24-Jul-00	3.29	3.80	1.40	1.40	4.00
7-Aug-00	3.00	3.90	4.08	0.80	3.00
21-Aug-00	3.57	3.36	2.38	1.77	2.81
5-Sep-00	4.70	3.74	4.68	2.13	3.19
18-Sep-00	4.25	3.13	2.72	1.09	2.57
2-Oct-00	4.48	3.80	4.72	1.07	3.53
6-Nov-00	3.85	5.95	5.70	6.45	9.16
4-Dec-00	5.61	8.95	5.12	5.74	5.44
Avg =	4.28	4.77	5.03	3.60	4.65
Median =	3.85	4.31	5.12	2.90	4.10
Exceedance	18 of 19, 95%	18 of 19, 95%	17 of 19, 89%	18 of 19, 95%	16 of 19, 84%

All dissolved oxygen concentrations reported as mg/L

Adequate dissolved oxygen is vital for aquatic life. Low dissolved oxygen concentration can be fatal to aquatic wildlife and is expected to impair WARM, COLD, WILD and RARE beneficial uses.

Fecal Coliform Sampling was done by the Padre Dam Municipal Wastewater District[2] intermittently from November 1998 to September 2000. Data was taken once a month for October-March and twice a month for April-October. The data shows that 11 of 18 samples (61%) in both wet and dry weather had levels of fecal coliform in excess of 400 Most Probable Number (MPN)/mL.

The Basin Plan[1] objective for fecal coliform has a temporal component stating that not more than 10% of the total samples during any 30-day period shall exceed the numeric criteria. The data provided by Padre Dam Municipal Wastewater District[2] does not contain more than 2 samples in any 30-day span, which makes it difficult to ascertain the severity of the exceedances. However, 7 of 8 months exceeded the fecal coliform objective in more than 10% of the samples. While the sample size per month is limited, the larger data set representing the longer temporal period shows the exceedance of the objective to be chronic. Therefore, it is concluded that this data set serves as evidence of impairment of the fecal coliform objective.

These concentrations of fecal coliform over the Basin Plan[1] objectives can contribute to human illness through contact with polluted waters, and are expected to impair REC1 beneficial use.

Phosphorus Sampling in September 1997 and from April to December 2000 by the Padre Dam Municipal Wastewater District[2] showed phosphorus concentrations to exceed the Basin Plan Objective for more than 10% of the time during a one-year period. See the table below for the raw data, averages, medians and the frequency of exceedances.

Date	Carlton Hills Blvd Bridge	Sycamore Creek /SD River	Old Mission Dam	Mission Pond	I5 Estuary
8-Sep-97	0.238	0.417	NF	NF	NF
22-Sep-97	0.258	0.590	NF	NF	NF
13-Oct-97	0.058	0.150	0.434	NF	NF
3-Nov-97	0.098	0.186	0.196	0.228	0.104
15-Dec-97	0.095	0.163	0.192	0.176	0.186
Avg =	0.149	0.301	0.274	0.202	0.145
Median =	0.098	0.186	0.196	0.202	0.145
Exceedance	2 of 5, 40%	5 of 5, 100%	3 of 3, 100%	2 of 2, 100%	2 of 2, 100%

Date	Carlton Hills Blvd Bridge	Mast Blvd Bridge	Old Mission Dam	Mission Pond	Fashion Valley Rd
3-Jan-00	0.063	0.151	0.141	0.210	0.113
7-Feb-00	0.048	0.120	0.106	0.169	0.082
6-Mar-00	0.165	0.214	0.212	0.208	0.251
3-Apr-00	0.066	0.111	0.156	0.157	0.226
17-Apr-00	0.071	0.125	0.161	0.178	0.324
1-May-00	0.072	0.101	0.197	0.183	0.168
15-May-00	0.070	0.068	0.164	0.190	0.241
30-May-00	0.085	0.134	0.193	0.259	0.183
12-Jun-00	0.103	0.139	0.236	0.269	0.257
26-Jun-00	0.082	0.153	0.274	0.293	0.312
10-Jul-00	0.042	0.095	0.125	0.129	0.147
24-Jul-00	0.084	0.210	0.232	0.278	0.255
7-Aug-00	0.078	0.195	0.285	0.316	0.240
21-Aug-00	0.076	0.224	0.298	0.285	0.239
5-Sep-00	0.066	0.208	0.153	0.308	0.295
18-Sep-00	0.154	0.241	0.220	0.414	0.280
2-Oct-00	0.074	0.194	0.161	0.374	0.245
6-Nov-00	0.078	0.151	0.179	0.199	0.193
4-Dec-00	0.017	0.095	0.120	0.090	0.060
Avg =	0.079	0.154	0.190	0.237	0.216
Median =	0.074	0.151	0.179	0.210	0.240
Exceedance	3 of 19, 16%	16 of 19, 84%	19 of 19, 100%	18 of 19, 95%	17 of 19, 89%

All phosphorus concentrations reported as mg/L

These concentrations of phosphorus over the Basin Plan[1] objective are expected to contribute to excess algae growth that may impair the REC1, REC2, WARM, COLD and WILD beneficial uses through the creation of odors, colors, increased turbidity and low dissolved oxygen environments[1].

TDS Sampling between September 1997 and December 2000 by the Padre Dam Municipal Water District[2] shows three locations along the San Diego River to exceed the Basin Plan TDS objective for more than 10% of the time during a one-year period. See the table below for the averages, medians and frequency of exceedances for three locations along the San Diego River. All 3 locations show a seasonal and an increasing trend over the 3 years reviewed. See charts below for trends.

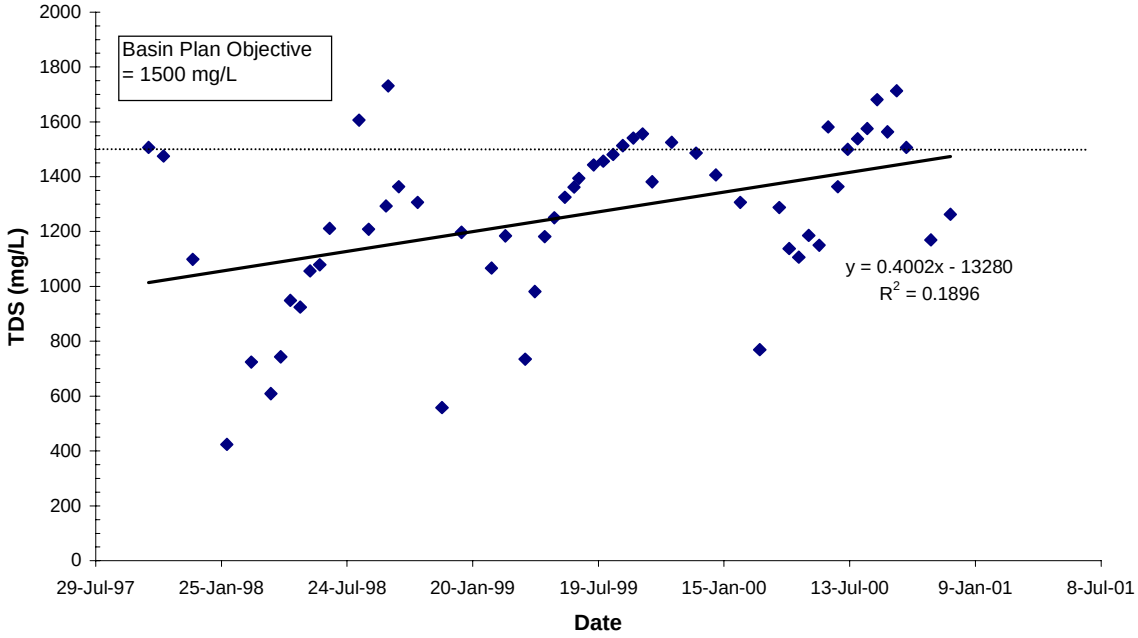
Total Dissolved Solids may consist of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, magnesium, sodium, iron and manganese. The most frequent constituents are usually salts (sodium, chloride, boron, etc.). Geologic conditions help to define the natural levels of many of these constituents. High concentrations of TDS are expected to impact the AGR beneficial use directly through irrigation waters or indirectly through adverse effects on soil permeability. TDS values between 450 to 2000 mg/L are expected to have a slight to moderate restriction on use of waters for irrigation of crops[1]. The average TDS concentration was toward the top of this range.

TDS in the San Diego River

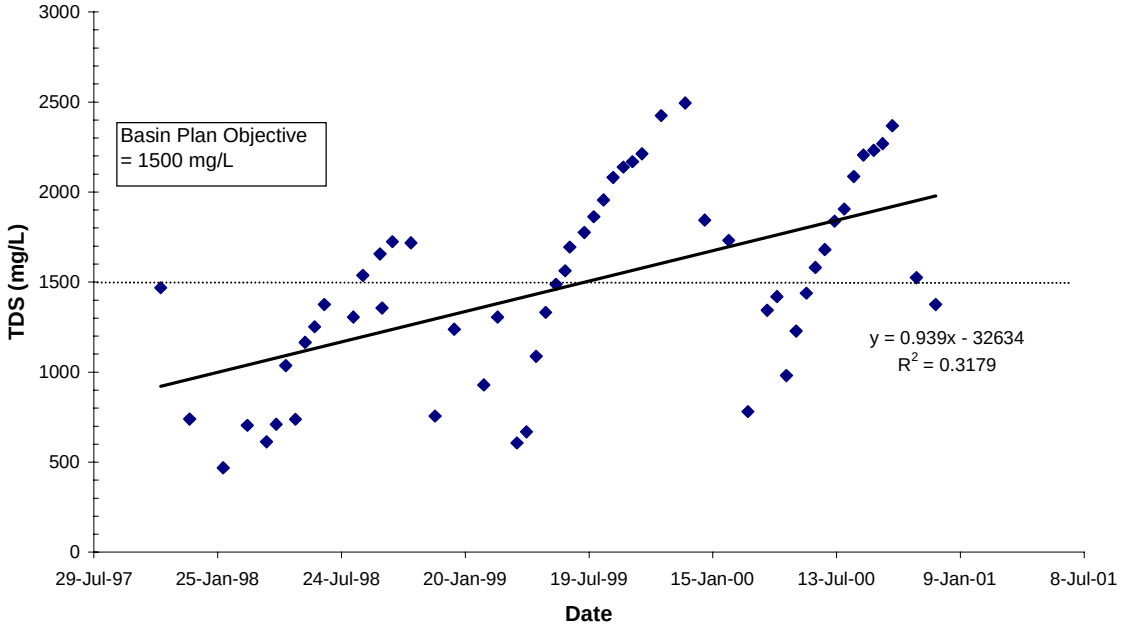
Date	Old Mission Dam (mg/L)	Mission Pond (mg/L)	Fashion Vlly RD (mg/L)
Sep 97 to Sep 98			
Avg =	1102.3	1074.9	Not
Median =	1089.0	1165.0	Sampled
Exceedances	3 of 16, 19%	2 of 15, 13%	
Oct 98 to Oct 99			
Avg =	1263.7	1515.3	1472.8
Median =	1343.5	1628.5	1550.0
Exceedances	3 of 20, 15%	11 of 20, 55%	10 of 19, 53%
Nov 99 to Dec 00			
Avg =	1372.0	1750.1	1785.0
Median =	1406.0	1731.0	1844.0
Exceedances	9 of 21, 43%	14 of 21, 67%	15 of 21, 71%

Basin Plan Objective = 1500 mg/L (not to be exceeded more than 10% of the time during a one-year period)

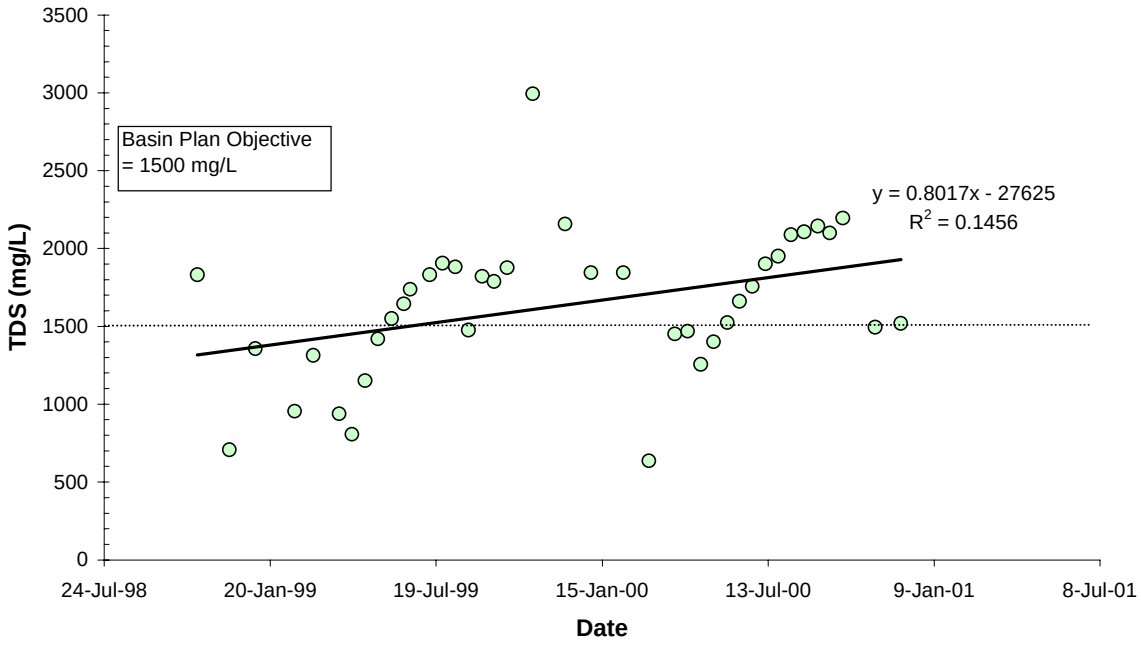
Total Dissolved Solids
San Diego River at Old Mission Dam
1997-2000



Total Dissolved Solids
San Diego River at Mission Pond
1997-2000



Total Dissolved Solids
San Diego River at Fashion Valley Rd
1987- 2000



EXTENT OF IMPAIRMENT

Dissolved Oxygen Low concentrations were observed at all stations from Carlton Hills Blvd Bridge down to Fashion Valley Road. The extent of impairment is therefore the entire lower portion of the river, which covers an area of approximately 20 miles.

Fecal Coliform High concentrations were observed at Fashion Valley Road. Downstream samples were taken at the San Diego River Estuary along Interstate 5 (I-5). The I-5 samples showed some bacterial impairment during the year 2000. The extent of impairment is therefore the lower portion of the river, downstream of the Fashion Valley Road site. This covers an area of 6.0 miles.

Phosphorus High concentrations were observed at all stations from Carlton Hills Blvd Bridge down to the Interstate 5 estuary. The extent of impairment is therefore the entire lower portion of the river, which covers an area of approximately 20 miles.

TDS High concentrations were observed from Old Mission Dam to Fashion Valley Road. The extent of impairment is therefore the lower portion of the river between these two stations. This covers approximately an area of 15 miles.

POTENTIAL SOURCES

Dissolved Oxygen Bacterial loading and subsequent decomposition of this and other organic matter. Other sources of pollutants that could lower oxygen concentrations could come from urban runoff, other point sources and non-point sources.

Fecal Coliform Urban runoff, other point sources, non-point sources and sewage spills.

Phosphorus Urban runoff, other point sources and non-point sources.

TDS The prevailing belief is that much of the TDS problem is anthropogenic in nature. Evaporation and natural salt sources also contribute. Other sources include urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Dissolved Oxygen Low

Fecal Coliform Medium

Phosphorus Low

TDS Low

Two studies are planned for the river and lead to the low priority rankings. The studies are: San Diego River Watershed Management Plan by the County of San Diego[3] and An Investigation of Nutrient Flux by the City of San Diego Metropolitan Wastewater Department.[4]

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Padre Dam Municipal Wastewater District, 2000. Receiving Water Sampling and Analysis. Electronic data submission to California Regional Water Quality Control Board, San Diego Region.

Other Information

[3] Brownyard, T. San Diego River Watershed Management Plan. County of San Diego, Department of Environmental Health.

[5] Wasserman, L. An Investigation of Nutrient Flux in the San Diego River Sediments and Potential Water Quality Impacts. Metropolitan Wastewater Department, City of San Diego.

SWITZER CREEK (Mouth of creek in San Diego Bay)
Hydrologic Subarea 908.22

NEW 303(d) LISTINGS

Benthic Community Degradation and Sediment Toxicity

PREVIOUS 303(d) LISTINGS

None

WATERSHED CHARACTERISTICS

Switzer Creek is an urban creek that drains into San Diego Bay. San Diego Bay is designated with the following beneficial uses: IND, NAV, REC1, REC2, COMM, BIOL, EST, WILD, RARE, MAR, MIGR and SHELL. [1]

WATER QUALITY OBJECTIVES NOT ATTAINED

Benthic degradation The Basin Plan[1] states that "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board." This objective was violated.

Sediment toxicity The Basin Plan[1] states that "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board." This objective was violated.

EVIDENCE OF IMPAIRMENT

Benthic degradation Sediment sampled in San Diego Bay by the Bay Protection Toxic Cleanup Program (BPTCP)[2] in December of 1996 at the outlet of Switzer Creek indicated the presence of elevated chemistries, toxicity, and benthic degradation. One core was sampled with 3 replicates to identify and quantify the benthic community. A Relative Benthic Index (RBI) was used to determine benthic degradation. The RBI ranges on a scale from 0 to 1. "It combines use of benthic community data (i.e. species diversity) with the presence or absence of positive and negative indicator species in order to provide a measure of the relative degree of degradation within the benthic fauna."[2] For example, *Capitella sp.* is a pollutant tolerant negative indicator species. Its presence in large numbers is indicative of a polluted benthic environment. An RBI of $\leq$ 0.3 is considered degraded, and the samples near Switzer Creek had an RBI of 0.02.

This information on benthic community health was not available in 1998. With only evidence of elevated sediment concentrations and sediment toxicity, Switzer Creek was not Section 303(d) listed. The addition of this information completes the "Triad of Evidence" (benthic community status, sediment toxicity and sediment chemistry) that was used as a criteria for the 1998 San Diego Bay listings for Sediment Toxicity and Benthic Community Degradation.

Sediment toxicity Sediments sampled by the Bay Protection Toxic Cleanup Program (BPTCP)[2] in December of 1996 were also used for toxicity testing. Amphipod solid phase survival tests were performed using *Eohaustorius estuarius* that were exposed to

sediments for 5 days. One sediment sample was divided into 5 replicates. Switzer Creek was the only station in San Diego Bay to show toxicity to *E. estuarius*, with less than a 48% survival rate. High concentrations of unionized ammonia, which naturally occurs in sediments, can be lethal to toxicity test organisms. Unionized ammonia concentrations were all below the application limit (0.8 mg/L; USEPA, 1995).[3] Hydrogen sulfide (H_2S) concentrations were above the observed "low effects" level (0.114 mg/L; Knezovich, 1996).[4] H_2S might have contributed to toxicity at this station, but seems unlikely because the H_2S concentration in another station was over twice as high without demonstrating toxicity.

Sea urchin embryo-larval development testing was performed on *Strongylocentrotus purpuratus* at the sediment / water interface for 96 hours. After the exposure period, larvae were examined to determine the proportion of normally developed larvae. The proportions of normal larvae were compared against control cultures to determine toxicity. Testing on *S. purpuratus* indicated toxicity. Ammonia levels were all below the "no effects" level (0.07 mg/L; Bay, 1993)[5] and likely did not contribute to observed toxicity. H_2S might have contributed to toxicity and should be considered a potential confounding factor.

Chemistry In addition, chlordane, lindane and PAH concentrations were all 4 times above the Effects Range Medians (ERMs) and 5.9 times above the Probable Effects Levels (PELs). The ERM reflects the 50th percentile of ranked data and represents the level above which effects are expected to occur. The PEL value is derived by taking the geometric mean of the 85th percentile of the "no effects" data and the 50th percentile of the "effects" data. Combining these high concentrations with evidence of benthic degradation and sediment toxicity satisfies the criteria that was used to list other San Diego Bay locations in 1998 based upon the same BPTCP data.[2,6]

All 3 components of the "Triad of Evidence" provide evidence that the benthic community is being negatively impacted in San Diego Bay at the mouth of Switzer Creek. This level of benthic degradation, sediment toxicity and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR and SHELL.

EXTENT OF IMPAIRMENT

Benthic degradation Area at the outlet of Switzer Creek, bound by piers on the north and south side of the outlet, extending to the edge of the piers.

Sediment toxicity Area at the outlet of Switzer Creek, bound by piers on the north and south side of the outlet, extending to the edge of the piers.

POTENTIAL SOURCES

Benthic degradation Elevated concentrations of chlordane, lindane, poly aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)[2] could be the cause. Current and historic shipyard activity may be a source. Historically, this site served as a PAH waste dump site for an SDG&E coal gasification plant.[7] Prior to that, the site served as one of the original garbage dumps in the San Diego region.[7] Other potential sources are urban runoff, other point sources, and non-point sources.

Sediment toxicity Elevated concentrations of chlordane, lindane, PAHs and PCBs[2] could be the cause. Current and historic shipyard activity may be a source. Historically, this site served as a PAH waste dump site for an SDG&E coal gasification plant.[7] Prior

to that, the site served as one of the original garbage dumps in the San Diego region.[7] Other sources are urban runoff, other point sources, and non-point sources.

TMDL PRIORITY

Benthic degradation High

Sediment toxicity High

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Bay Protection Toxic Cleanup Program, 1998. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. California State Water Resources Control Board.

[3] United States Environmental Protection Agency, 1995. Short term methods for estimating the chronic toxicity of effluent and receiving water to west coast marine and estuarine organisms. EPA/600/R-95/136. Office of Research and Development. Washington, D.C. U.S.A.

[4] Knezovich, J., D. Steichen, J. Jelinski and S. Anderson. 1996. Sulfide tolerance of four marine species used to evaluate sediment and pore water toxicity. Bull. Environ. Contam. Toxicol. 57: 450-457.

[5] Bay, S., R. Burgress and D. Greenstein. 1993. Status and applications in the Echinoid (Phylum Echniodermatata) toxicity test methods. In: W.G. Landis, J.S. Hughes and M. A. Lewis, eds. Environmental Toxicology and Risk Assessment. ASTM, STP 1179, Philadelphia, PA.

[6] Bay Protection Toxic Cleanup Program, 1998. Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region. Final Addendum Report. California State Water Resources Control Board.

[7] California Regional Water Quality Control Board, San Diego Region. Staff observations. 2001.

PACIFIC OCEAN SHORELINE AT CORONADO BEACH
Hydrologic area 910.00

Note: This Fact Sheet supports the **de-listing** of Pacific Ocean Shoreline at Coronado Beach. Remedial measures taken in response to Regional Board enforcement actions have resulted in water quality that now meets applicable water quality objectives.

NEW 303(d) *DE*-LISTINGS

Bacterial indicators (total coliform, fecal coliform)

PREVIOUS 303(d) LISTINGS

High Coliform Count at the following Coronado Beach segments: North Beach / Sunset Park, Loma Avenue, and Pine Street

WATERSHED CHARACTERISTICS

The Coronado Hydrologic Area is composed of the North Island Naval Air Station, the City of Coronado and the Silver Strand. North Beach is located adjacent to the perimeter of the North Island Naval Station. Sunset Park drains directly into North Beach. Loma Avenue and Pine Street are located in the area of Coronado known as Central Beach.

Coastal waters, including Coronado Beach, include some or all of the following beneficial uses: IND, NAV, REC1, REC2, COMM, BIOL, WILD, RARE, MAR, AQUA, MIGR, SPWN, and SHELL.

This Fact Sheet describes evidence of the restoration of the REC1 beneficial use due to reduced bacterial contamination at Coronado beaches. The REC1 beneficial use is described as "uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible[1]."

WATER QUALITY OBJECTIVES ATTAINED

Total coliform The Ocean Plan[2] REC1 objective states that not more than 20% of samples at any sampling station, in any 30-day period, shall exceed 1000 colonies/100 mL. Additionally, no single sample, when verified by a repeat sample taken within 48 hours, shall exceed 10,000 colonies /100 mL.

The Ocean Plan[2] and Basin Plan[1] SHELL objective states that the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70 colonies/100 mL, nor shall more than 10 percent of the samples collected during any 30-day period exceed 230 colonies/100 mL for a five-tube decimal dilution test or 330 colonies/100 mL when a three-tube decimal dilution test is used.

Fecal coliform The Basin Plan[1] REC1 objective states that for not less than 5 samples, in any 30-day period, the log mean shall not exceed 200 colonies/100 mL. Additionally, no more than 10% of the total samples during any 30-day period shall exceed 400 colonies /100 mL.

EVIDENCE OF REC1, SHELL BENEFICIAL USE ATTAINMENT

Bacterial concentration data from the City of Coronado,[3,4] for the beaches of Coronado was reviewed for this listing cycle. In January 2000, the City of Coronado submitted a Final Report[3] as required by Regional Board Cease and Desist Order No.98-74. This report formally requested the rescission of both this Cease and Desist Order, as well as Cleanup and Abatement Order No. 97-69. Both of these orders had been issued by the

Regional Board to address the severe bacterial contamination at North Beach, one of the coastal areas on the 1998 303(d) list. To comply with these orders, the City of Coronado implemented wet / dry weather diversion systems in areas that discharge into North Beach, and an ultra-violet (UV) treatment system to treat discharges. Fecal and total coliform data submitted in this report showed monitoring at 3 sites, 2 in North Beach and 1 in Central Beach. The data contained in this report is a sub-set of the data described in the report below.

In January 2001, the City of Coronado submitted a Semi-Annual Waste Discharge Compliance Report[4]. Weekly monitoring was done by both the City of Coronado and the San Diego County Department of Environmental Health. This report showed monitoring along Coronado Beach at four monitoring stations. Two stations are located in the vicinity of North Beach, which are called "Surf Zone A" and "Surf Zone C." Surf Zone A is in the tidal zone directly downstream of the outfall from Sunset Park. Surf Zone C is located 50-ft. upshore of Surf Zone A. One monitoring location is at Central Beach, which is adjacent to F Street. The Pine Street outfall lies between the Surf Zone A monitoring location and the Central Beach monitoring location. Additionally, monitoring is done at Avenida del Sol. The Loma Avenue outfall is between the Central Beach and Avenida del Sol monitoring sites. A map showing the previously listed locations, as well as the monitoring locations, is shown below. These 4 monitoring stations provide coverage of the 4 beach locations recommended for de-listing.

Coastal Ocean Outfalls and Water Quality Sample Test Sites

Outfall locations:

1 = Coronado Street (downstream of Sunset Park)
2 = Pine Street
3 = G Street
4 = F Street
5 = Loma Avenue
6 = Churchill Place

A summary of the data is provided below. The column labeled "Number of Exceedances" refers to the number of times one of the aforementioned water quality objectives was exceeded.

Location	Monitoring Start	Last Reported	No. of Exceedances (REC1, Total Coliform)	No. of Exceedances (REC1, Fecal Coliform)	No. of Exceedances (SHELL, Total Coliform)
Surf Zone C	1/13/00	1/2/01	4	3	0
Surf Zone A	5/26/99	12/28/00	3	4	0
Central Beach	11/1/99	1/2/01	3	4	0
Ave. del Sol	4/3/00	1/2/01	3	1	2

This bacterial concentration data demonstrates minimal contamination in these areas. The temporal span covers almost one full year in one location and almost two full years in two locations. Further, the spatial span of these areas are sufficient to cover the areas described in the 1998 303(d) list. These areas include North Beach / Sunset Park, Loma Avenue, and Pine Street.

Based on this bacterial concentration data, the de-listing of North Beach and Central Beach from the 303(d) list is recommended.

EXTENT OF DE-LISTED AREAS

This de-listing recommendation and Fact Sheet applies only to the 1998 listing of the Pacific Ocean Shoreline at Coronado Beach. Although in the same hydrologic area, it should not be confused with the 2002 new listing of San Diego Bay Shoreline at Tidelands Park, which is located on the bayside of Coronado Island. See Fact Sheet for Pacific Ocean Shoreline, San Diego Region (pgs B69 – B74) for rationale pertaining to the listing of Tidelands Park.

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

[2] Water Quality Control Plan for Ocean Waters of California, 1997. State Water Resources Control Board.

Data Sources

[3] Final Report for Cease and Desist Order No. 98-74; Demonstration of Compliance. City of Coronado, January 2000.

[4] Semi-Annual Waste Discharge Compliance Report for the City of Coronado, in compliance with NPDES Order No. 90-42, January 2001.

TIJUANA RIVER ESTUARY
Hydrologic Subarea 911.11

NEW 303(d) LISTINGS
Dissolved Oxygen (DO)

PREVIOUS 303(d) LISTINGS
Eutrophication, Coliform, Lead, Nickel, Pesticides, Thallium and Trash.

WATERSHED CHARACTERISTICS
The Tijuana River Watershed comprises a region of approximately 1,750 square miles that lies astride the California-Baja California border. Approximately one third of the watershed is in the United States and two thirds is in Mexico. The watershed contains the Tijuana River Estuary, a protected area containing one of the largest remaining functioning wetlands. The estuary encompasses an area of about 150 acres. The estuary is designated with the following beneficial uses: REC1, REC2, COMM, BIOL, EST, WILD, RARE, MAR, MIGR and SHELL.[1]

WATER QUALITY OBJECTIVE NOT ATTAINED
Dissolved Oxygen The Basin Plan[1] objective for dissolved oxygen concentration is 5.0 mg/L in any waterbody designated with a MAR beneficial use. In addition, the Basin Plan sets an annual objective of 7mg/L that shall not be exceeded more than 10% of the time during a one-year period.

EVIDENCE OF IMPAIRMENT
Dissolved Oxygen Dissolved oxygen measurements were collected every 30 minutes for the entire year of 1997 and 1998. Due to the large amount of data collected, only 1998 data were summarized. Data for 1997 were reviewed and found to follow similar trends.

Dissolved oxygen concentrations violated the water quality objective almost every day of the month. Dissolved oxygen concentrations generally dropped below the water quality objective for a portion of the day (typically between 10pm and 8am). Although it is typical for dissolved oxygen concentrations to decrease during this time period, the DO levels in the estuary dropped to excessively low concentrations (generally below 3 mg/L). The table below shows the mean, median and percent above or below both water quality objectives during 1998. The median concentrations for 6 of the 12 months (50%) were below 5 mg/L and the median concentrations for 7 of 12 months (58%) were below 7.0 mg/L. This high percentage of median concentrations below 7.0 mg/L is considered as evidence of violation of the annual Basin Plan objective for dissolved oxygen. These low DO conditions are expected to impair the COMM, BIOL, EST, WILD, RARE, MAR and MIGR beneficial uses.

Month	Dissolved Oxygen Average (mg/L)	Median (mg/L)	Median (% below 5.0)	Median (% below 7.0)
Jan-98	8.5	8.3	-65.2%	-18.0%
Feb-98	7.3	7.4	-47.2%	-5.1%
Mar-98	8.1	7.0	-40.9%	-0.6%
Apr-98	7.4	6.1	-22.2%	12.7%
May-98	6.8	6.0	-20.5%	13.9%
Jun-98	3.8	2.6	48.4%	63.1%
Jul-98	2.7	1.2	75.2%	82.3%
Aug-98	4.1	3.3	33.4%	52.4%
Sep-98	3.8	2.9	41.9%	58.5%
Oct-98	7.4	7.3	-46.0%	-4.3%
Nov-98	4.7	4.6	8.1%	34.4%
Dec-98	6.6	7.2	-43.6%	-2.6%

a negative percent indicates that the median was above the either 5.0 or 7.0

EXTENT OF IMPAIRMENT

Dissolved oxygen Only one sampling point was assessed for dissolved oxygen concentrations. Despite this, the entire estuary is likely to have low DO concentrations due to the massive loading of bacteria from raw sewage flows. Therefore, the entire estuary (150 acres) is listed as impaired.

POTENTIAL SOURCES

Dissolved oxygen Raw sewage flows bring massive bacterial loading that can deplete available oxygen. Other sources of compounds that may cause low DO include decaying organic matter, urban runoff, other point sources and non-point sources.

TMDL PRIORITY

Dissolved oxygen Low

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Toxic Substances Monitoring Program, Preliminary Data Tables. 1997 – 1999. State Water Resources Control Board.

PINE VALLEY CREEK, Upper
Hydrologic Subarea 911.30

NEW 303(d) LISTINGS
Enterococci

PREVIOUS 303(d) LISTINGS
None

WATERSHED CHARACTERISTICS
The Tijuana watershed is a 470 square mile land area that is drained by the Cottonwood Creek and Campo Creek, which are tributaries of the Tijuana River. This watershed lies in the southeast corner of San Diego County and 75% of the area resides in Mexico. Pine Creek flows into Barrett Reservoir. Water from Barrett Reservoir is conveyed by flume to Dulzura Summit where it is discharged into the headwaters of Dulzura Creek. Dulzura Creek flows to Lower Otay Reservoir, where in most years it is drawn, treated, and distributed as potable water. Only in very wet years will the dams at Lower Otay or Barrett spill. When Barrett spills, the flow is into Cottonwood Creek, which then flows into Mexico. Cottonwood Creek is a tributary of the Tijuana River. When Lower Otay spills, it is into the Otay River. Designated beneficial uses of Pine Valley Creek include: MUN, AGR, IND, PROC, FRSH, REC1, REC2, WARM, COLD and WILD.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED
Enterococci The bacterial objectives used for evaluation of Pine Valley Creek water quality pertain to freshwater areas considered moderately or lightly used. This particular decision, namely the extent to which the area is used, is based on best professional judgement. Although both steady state (30-day period) and single sample objectives are available, only the particular objective used for data assessment is described.

The Basin Plan[1] REC1 single sample maximum allowable density is 108 colonies/100 mL, for a moderately or lightly used area.

EVIDENCE OF IMPAIRMENT
Enterococci The City of San Diego Water Department[2] sampled five locations along the Pine Valley Creek shoreline from January to December 1998. At sampling station PVC1a, the data showed that 6 of 11 samples (55%) exceeded the Basin Plan[1] objectives for enterococci. There was evidence of both wet and dry weather impairment of the creek at this location. The raw data at sampling station PVC1a is shown below. The samples indicating exceedances of water quality objectives are highlighted.

Sampling Date	Enterococci (CFU / 100 mL)	Sampling Date	Enterococci (CFU / 100 mL)
1/14/98	20	5/20/98	100
2/4/98	**20000**	6/18/98	**140**
2/24/98	**2100**	7/14/98	**130**
3/4/98	50	8/18/98	**260**
3/18/98	27	9/15/98	100
4/15/98	**530**		

The concentration levels of enterococci in Pine Valley Creek over the Basin Plan[1] objectives can contribute to human illness through contact with contaminated water, and is expected to impair the REC1 beneficial use.

In addition, visual inspection of this section of the creek by San Diego Regional Water Quality Control Board staff[3] revealed heavy use of the creek for cattle grazing and impacts from numerous nearby horse stables. Undocumented migrants traveling through the Pine Valley Reserve use this portion of the creek. Encampments are frequently noted in this area.

EXTENT OF IMPAIRMENT

Enterococci The extent of impairment is the two mile reach between stations PVC1a and PVC1b. Sampling at PVC1b, which is downstream of PVC1a, showed little impairment.

POTENTIAL SOURCES

Enterococci Impairment appears to come from horse stables, cattle grazing in and near the creek, and human encampments.

TMDL PRIORITY

Enterococci Medium. The PVC1a sampling station is located 0.25 miles below the confluence of the Upper Pine Valley Creek and the South Pine Creek tributary that is at the Old Highway 80 crossing. Impairment due to bacteria can probably be reduced or eliminated through proper Best Management Practices (BMPs) for horse stables and livestock grazing.

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] City of San Diego Water Department, 1998. Pine Creek Assessment Project (PCAP) Raw Bacteria Data.

[3] California Regional Water Quality Control Board, San Diego Region. Staff observations. 2001.

PACIFIC OCEAN SHORELINE FOR SAN DIEGO REGION
(including San Diego Bay, Mission Bay, and Dana Point Harbor)
Hydrologic Units 901.00-911.00

Note: This Fact Sheet is inclusive of all coastal public beaches within the Hydrologic Units of the San Diego Region that are impaired due to bacterial indicator exceedances, including the public beaches of San Diego Bay, Mission Bay, and Dana Point Harbor.

NEW 303(d) LISTINGS

Bacterial indicators (total coliform, fecal coliform, enterococci)

PREVIOUS 303(d) LISTINGS

High Coliform Count

WATERSHED CHARACTERISTICS

Coastal watersheds in the San Diego region are highly urbanized, with relatively high population densities. Coastal waters include some or all of the following beneficial uses: IND, NAV, REC1, REC2, COMM, BIOL, WILD, RARE, MAR, AQUA, MIGR, SPWN, and SHELL. All listed public beaches and bays include the REC1 beneficial use.

The subject of this Fact Sheet is impairment of the REC1 beneficial use at public beaches and bays due to bacterial contamination. The REC1 beneficial use is described as "uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible[1]." The SHELL beneficial use is also designated for all areas adjacent to the Pacific Ocean, including San Diego Bay, Mission Bay, and Dana Point Harbor.

WATER QUALITY OBJECTIVES NOT ATTAINED

Total coliform The Ocean Plan[2] REC1 objective states that not more than 20% of the samples at any sampling station, in any 30-day period, shall exceed 1000 colonies/100 mL. Additionally, no single sample, when verified by a repeat sample taken within 48 hours, shall exceed 10,000 colonies /100 mL.

The Basin Plan[1] REC1 objective for Bays and Estuaries states that the most probable number of coliform organisms in the upper 60 feet of the water column shall be less than 1000 per 100 mL (10 per mL); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1000 per 100 mL (10 per mL), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 (100 per mL).

The Basin Plan[1] and Ocean Plan[2] SHELL objective states that the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70 colonies/100 mL, nor shall more than 10 percent of the samples collected during any 30-day period exceed 230 colonies/100 mL for a five-tube decimal dilution test or 330 colonies/100 mL when a three-tube decimal dilution test is used.

Fecal coliform The Basin Plan[1] REC1 objective states that for not less than 5 samples, in any 30-day period, the log mean shall not exceed 200 colonies/100 mL. Additionally, no more than 10% of the total samples during any 30-day period shall exceed 400 colonies /100 mL.

Enterococci The Basin Plan[1] REC1 objective states that the steady state value log mean indicator density (generally not less than 5 samples equally spaced over a 30-day period) for enterococci in a saltwater body shall not exceed 35 colonies/100 mL. Additionally, no single sample shall exceed 104 colonies /100 mL in a designated beach saltwater body. These numeric criteria originated in guidance published by USEPA[3].

Fecal Coliform / Total Coliform Ratio The California Department of Health Services (DHS) has published guidance for bacterial monitoring at salt and fresh water beaches[3]. Department of Health Services bacteriological standards of single samples for total coliform, fecal coliform, and enterococci are identical to the Basin Plan[1] and Ocean Plan[2] objectives described above. In addition to these standards, DHS also describes a fourth standard. This states that a single sample for total coliform shall not exceed 1000 colonies/100 mL if the ratio of fecal coliform/total coliform exceeds 0.1[4].

EVIDENCE OF IMPAIRMENT

Data was submitted by several agencies [5-12] for this listing cycle. Impairment was determined in San Diego County based on Beach Posting and Closing Data[7] from the San Diego County Department of Environmental Health. Impairment was determined in Orange County based on Beach Closures[5] and Postings Data for Assembly Bill 411[6] from the Environmental Health Care Agency, County of Orange. Data for the Year 2000 was reviewed. These reports demonstrate recurring bacterial exceedances of REC1 Basin Plan[1], Ocean Plan[2], and California DHS[4] objectives or standards.

Beach and bay bacterial exceedances in the San Diego Region are indicated by temporary public health risk warnings, or general advisories (hereafter referred to as general advisories), and beach closures. General advisories are assigned to beach locations where routine monitoring performed by the county health departments have indicated violations of any one of the four bacteriological standards described by DHS, three of which are identical to Basin Plan[1] and Ocean Plan[2] objectives. General advisories remain in effect until continued monitoring shows that bacterial levels do not exceed any of the four water quality standards or objectives. Beach closures follow a sewage spill. Closures remain in effect until continued monitoring shows that bacterial levels do not exceed any of the four water quality standards or objectives.

General advisories and beach closures are indicated publicly by placement of temporary beach postings. These postings are placed and removed by county health departments.

Raw data used to generate advisory and closure reports[5-7] was not assessed by the Regional Board to determine impairments. Rather, the advisory and closure reports[5-7] were used, since these are indicative of REC1 bacterial exceedances. Although the SHELL beneficial use applies to all coastal waters, the water quality objectives associated with this beneficial use, which are more stringent than REC1 beneficial use, were not evaluated. The nature of the data, in the form of advisory and closure reports,[5-7] did not permit evaluation of water quality objectives associated with the SHELL beneficial use.

In one isolated case where raw bacterial data was assessed, the SHELL beneficial use was evaluated. This occurred at Coronado Beach and lead to the recommendation for de-listing. The rationale for de-listing can be found in a separate Fact Sheet (pgs B62 – B64).

CRITERIA FOR LISTING

Beaches were listed as impaired if the number of days that water quality exceeded bacterial REC1 standards (indicated by either general advisories or beach closures) was greater than 10 days per year. The days did not have to be consecutive and the season of the posting was not a consideration. The choice of >10 days per year as the listing criteria was based upon best professional judgement, including consideration of the relative threat to human health associated with bacterial contamination. This temporal span was considered to be indicative of REC1 beneficial use impairment due to elevated bacterial concentrations.

RESULTS

The results of the assessment are presented below in three distinct categories that describe changes to the 1998 listing and new 2002 listing recommendations. For the current list update, a waterbody listing is defined first by hydrologic boundaries, and then by individual bodies or segments of water within those boundaries. Please see the Staff Report, pages 15 and 19-20 for more information on how a listing is defined.

The first category describes the extent of impairment that was applied to all newly recommended listings and to most of the previous listings. The second category describes additions of new segments to 1998 listings. This resulted in changes to the extent of impairment to previously listed hydrologic units, areas, or subareas. In contrast, the third category recommends addition of new, distinct segments that were not contained within hydrologic units, areas, or subareas described in the 1998 303(d) list. These new segments constitute new listings. The segments of impairment for both the 1998 and 2002 list update are defined within larger hydrologic boundaries and are presented in Table 4.

Extent of Impairment

For each listed beach, impairment generally occurs at the mouth of a creek or storm drain. The recommended extent of impairment is 400 yards (0.2 mi.) on each side of the drain / outlet, for a total of 800 total yards (0.4 mi.). This is based on the Santa Monica Bay Epidemiology Study[13], which estimated the “safe zone” for swimming near storm drains associated with public beaches to be 400 yards from either side of an outlet containing urban runoff. This distance is set as the extent of impairment for all new and existing beach and bay listings to more accurately demarcate bacterial contamination. The extent of impairment for most existing listings was therefore increased to reflect this finding. If an existing listing had an extent of impairment larger than 0.4 miles, then no changes were recommended. Extents of impairment for individual segments have been summed to provide the total extent of impairment within the larger hydrologic listing. Often, the individual segments within a single listing are closer than 0.4 miles apart. In these cases, the total extent of impairment for each listing is less than the sum of all individual segments and takes overlapping spatial extents into account.

Additions of New Segments to 1998 Listings

The 1998 303(d) list presents beach and bay impairments as segments within hydrologic units (HU), hydrologic areas (HA), or hydrologic sub areas (HSA). Applying the aforementioned listing criteria to new data revealed that the 1998 beach and bay listings should be updated to include more segments in previously listed waterbodies. The evidence showing support of this is presented below in Table B1. The segments shown below are not newly recommended listings, but are additional segments within previously listed waterbodies located within previously listed hydrologic boundaries. It is

recommended that the extent of impairment within existing listings be modified to include these segments. Table B1 shows the number of days that each beach / bay segment, recommended for addition, demonstrated exceedances in REC1 standards or objectives, as indicated by either a general advisory or beach closure in 2000.

Table B1 - New Locations within 1998 Listings

	Hydrologic Descriptor		Waterbody	Segment / Area	# Days Posted (Year 2000)
1	901.27	Lower San Juan HSA	Pacific Ocean Shoreline	South Capistrano Beach at Beach Road	41
2	901.51	San Onofre Valley HSA	Pacific Ocean Shoreline	San Onofre State Beach at San Mateo Creek outlet	15
3	907.11	Mission San Diego HSA	Pacific Ocean Shoreline	Ocean Beach at Bermuda Ave	13
4	908.10	Point Loma HA		at Kellogg Street beach	13
			San Diego Bay Shoreline	Shelter Island Shoreline Park	24
			San Diego Bay Shoreline		
5	910.10	Coronado HA		at Tidelands Park	17
			San Diego Bay Shoreline		

San Diego Bay, although a large waterbody covering several hydrologic areas, is treated as one waterbody. Therefore, it is reported on the Section 303(d) list once, having several segments of impairment.

Additions of New Segments that lead to New Listings

Of the 18 beach and bay listings in Table 4, 16 were listed in the 1998 listing cycle. The Regional Board recommends adding one new beach segment and one new bay segment to the 2002 list update. These new locations show evidence of impairment of the REC1 beneficial use. Table B2 shows the number of days that each newly recommended beach / bay segment demonstrated exceedances of REC1 standards or objectives, as indicated by either a general advisory or beach closure in 2000.

Table B2 - New Section 303(d) Listings

	Hydrologic Location		Waterbody	Segment / Area	# Days Posted (Year 2000)
1	901.14	Dana Point HSA	Dana Point Harbor	at Baby Beach	54
2	906.10	Miramar Reservoir HA	Pacific Ocean Shoreline	Torrey Pines State Beach at Los Penasquitos Lagoon outlet	32

These newly recommended segments are not within the hydrologic or waterbody boundaries of any of the 1998 Section 303(d) listings. Therefore, the addition of these segments leads to the addition of new listings. Although the hydrologic sub area 901.14 (Dana Point HSA) was previously listed, the segment specified in 1998 consisted of Pacific Ocean shoreline. Dana Point Harbor at Baby Beach is a distinct waterbody, and

is therefore a new listing. While the hydrologic area 906.10 (Miramar Reservoir HA), was on the 1998 Section 303(d) list, the Pacific Ocean Shoreline was not listed within this hydrologic boundary. Therefore, Pacific Ocean Shoreline: Torrey Pines State Beach at Los Penasquitos Lagoon outlet is also a new listing.

POTENTIAL SOURCES

Bacterial Indicators sewage spills and leaks, urban runoff, other point sources and non-point sources, domestic and wild animals

TMDL PRIORITY

High A high priority is assigned to most beach / bay listings showing impairment from bacterial contamination, which has the potential to adversely affect human health. See Tables 1 and 3 for the priority designations for each segment of beach and bay shoreline. The Regional Board is currently developing a Total Maximum Daily Load (TMDL) to address elevated bacterial contamination in Mission Bay.

INFORMATION SOURCES

Water Quality Objectives and Watershed Characteristics

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

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[3] Ambient Water Quality Criteria for Bacteria, 1986. United States Environmental Protection Agency. EPA A440/5-84-002.

[4].Draft Guidance for Salt and Fresh Water Beaches + Appendices, 2000. California Department of Health Services.

Data Sources

[5] 1997-2001 Beach Closures. April, 2001. Environmental Health Care Agency, County of Orange. Santa Ana, California.

[6] 1999-2000 Posting for AB 411. Environmental Health Care Agency, County of Orange. Santa Ana, California.

[7] Beach Posting and Closing data from 1997 – 2000. 2000. San Diego County Department of Environmental Health. San Diego, California.

[8] South East Regional Reclamation Authority, 2000. Monthly Monitoring Repots, MRP 2000-13, NPDES Permit No. CA0107417

[9] Southern California Bight 1998 Regional Monitoring Program: I. Summer Shoreline Microbiology. 2001. Southern California Coastal Waters Research Project (SCCWRP). Westminster, California.

[10] Southern California Bight 1998 Regional Monitoring Program: II. Winter Shoreline Microbiology. 2001. Southern California Coastal Waters Research Project (SCCWRP). Westminster, California.

[11] Southern California Bight 1998 Regional Monitoring Program: 3. Storm Event Shoreline Microbiology. 2001. Southern California Coastal Waters Research Project (SCCWRP). Westminster, California.

[12] Volunteer Collected Estuary Water Quality Data (bacteria) 2000-2001. Electronic data submission. Tijuana Visitors Center, Chula Vista, California.

Other sources

[13] Haile, Robert W., John S. Witte, Mark Gold, Ron Cressey, Charles McGee, Robert C. Millikan, Alice Glasser, Nina Harawa, Carolyn Ervin, Patricia Harmon, Janice Harper, John Dermand, James Alamillo, Kevin Barrett, Mitchell Nides, and Guang-yu Wang, 1999. "The Health Effects of Swimming in Ocean Water Contaminated by Storm Drain Runoff." *Epidemiology* 10:355-363.